

# Mobile Banking Adoption: An exploration of the behavioural intention of consumers in Ireland

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A Research Dissertation submitted in partial fulfilment for the Degree of  
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## **Abstract**

The aim of this research study is to identify the salient theoretical frameworks and their underlying constructs that can explain the behavioural intention of the consumer towards mobile banking adoption in Ireland. A conceptual model is formulated and tested based on the constructs identified in the Technology Acceptance Model, Innovation Diffusion Theory which are extended to include perceived risk, perceived trust and self-efficacy.

The research study employed a quantitative method. An online survey was conducted in Ireland using a snowball sampling technique to collect the data. SPSS was used to analyse the 233 valid responses received. Tests of scale reliability, normality, correlation and multiple linear regression were undertaken to develop a conceptual model which was tested for fit compared to observed results from the survey instrument.

Findings of this research indicated that perceived trust, perceived usefulness and compatibility as important influencing factors on consumers' behavioural intention to adopt mobile banking in Ireland. Perceived ease of use, perceived risk and self-efficacy were found not to be significant factors influencing consumers' behavioural intention towards mobile banking in Ireland.

Finally previous research studies have focused almost entirely on SMS banking in developing nations with no studies found that addressed more developed mobile banking applications available on mobile devices in developed nations, nor has there been a study exploring the reasons for and against mobile banking adoption in an Irish context. This study attempts to address these factors.

# Submission of Thesis and Dissertation

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# Chapter One: Introduction

## 1.0 Research motivations

Rapid technological innovation, global competition, and increasingly knowledge driven economies have been enabled by, and contributed to, the growth and development of the internet as a service delivery channel. The internet has both the attributes and advantages that can transcend the limits of space and distance facilitating the delivery of service “anywhere at any time” from an internet enabled device (Tung et al., 2014). These technological advances have enabled consumers to avail of banking services without the need to physically visit a bank. Financial institutions have also identified the opportunities these technological advances present to attract new customers, develop and maintain current customer relationships, cross selling of products and develop new innovative service offerings (Kearney, 2012, Nel & Boshoff, 2014; Shaikh & Karjaluoto, 2014).

Mobile banking is one of the latest technological advances that financial institutions are attempting to leverage as a distribution channel (Al-Jabri & Sohail, 2012; Shaikh & Karjaluoto, 2014; Nel & Boshoff, 2014). Dash & Bhusan, (2014) contend that the integration of internet technologies and mobile networks has created new opportunities and applications for delivery of banking services; and that mobile banking provides the most ubiquitous delivery mechanism for banking services due to increased usage of smart mobile phones and tablet personal computers (PC). As a result of mobile devices overtaking desktop PC's as the most common personal computing interface mobile banking has increased in importance a potential service delivery channel (Lee, Zhang & Chen, 2013). This has led to financial institutions attempting to extend internet banking and other banking services to mobile devices which is both a logical and appropriate development in electronic banking (Dash & Bhusan, 2014). Mobile banking services offered through mobile banking

applications on smartphones and mobile devices are expected to significantly change the banking business model (Kearney, 2012; Moser, 2014; Shaikh & Karjaluo, 2014). The proliferation of smartphones has increased the demand for mobile banking services, prompting financial service providers to create new services and mobile applications targeting this new demand. The intention of these new mobile services is the attraction of new customers, increased customer retention rates, reduction of costs, improved efficiency and growth of market share (Shaikh & Karjaluo, 2014). However, despite the potential benefits mobile banking represents, research indicates that only 15% of mobile subscribers are expected to use mobile banking globally by 2017 (Shaikh & Karjaluo, 2014). These low penetration figures indicate that significant growth opportunities exist for mobile banking, additionally it indicates that mobile banking has displayed persistent issues related to its adoption and use (Shaikh & Karjaluo, 2014).

Lee et al., (2013) posit there have been a number of studies conducted into mobile banking in recent years the focus of which has covered the following areas:

- Differences between online and mobile banking
- Benefits of mobile banking
- Mobile banking adoption and resistance factors
- Security issues of mobile banking
- Functions features and devices used for mobile banking

Illia et al., (2015) further state that in the IS field many of the studies have been conducted using the Technology Acceptance Model (TAM) or TAM2 to determine the factors explaining mobile banking adoption. However these frameworks do not include key elements such as trust and risk associated with adoption of e-commerce (Illia et al., 2015).

Koksal, (2016) states that the literature makes constant reference to the need to examine the factors influencing the adoption and use of mobile banking. Shaikh & Karjaluto, (2014) argue that the existing research studies have focused on Short Message Service (SMS) banking, a variant of mobile banking, and have been carried out in developing rather than developed nations. Additionally there have been no studies directly addressing the adoption and use of mobile banking via mobile banking applications on smartphones or tablet PC's in developed nations (Ha, Canedoli, Baur & Bick, 2012; Shaikh & Karjaluto, 2014).

The aim of this study is to fill the identified research gap in the context of Ireland. By reviewing the existing literature on mobile banking adoption, developing a conceptual model with potentially greater explanatory power than TAM and to identify the most important factors influencing consumer's behavioural intentions to adopt mobile banking in Ireland.

## **1.1 Dissertation purpose and aim**

The purpose of this research is to investigate mobile banking adoption in Ireland with the aim of identifying the constructs that significantly influence the consumer's behavioural intention to adopt mobile banking.

To achieve this aim the following tasks are performed:

- A literature review is undertaken with the aim of identifying the key theoretical models their underlying constructs and the development of conceptual framework for mobile banking adoption in Ireland.
- Explore the influence of demographics on consumers' behaviour intention to adopt mobile banking.
- Undertake empirical testing of the conceptual model to identify the effects and significance of the underlying constructs on consumer's behavioural intention to adopt mobile banking.

- Test the conceptual model fit using the evidence gathered and test the proposed hypotheses in the research study.

## **1.2 Dissertation structure**

Chapter One presents the dissertation research motivations, it identifies the dissertation purpose and aims, and describes the dissertation structure.

Chapter Two explores the literature in the areas of digitisation of banking services, mobile banking, Innovation Diffusion Theory and Technology Acceptance Models.

Chapter Three formulates the conceptual framework, to identify the variables that have been selected from the related theoretical frameworks and literature and sets out the hypotheses that are to be tested.

Chapter Four discusses the research methodology, describing and justifying the approach used in this research study.

Chapter Five examines the data analysis and results of the research including an outline of the sample, the influence of demographics on the dependent variable. It also develops the conceptual model and illustrates the results relating to test reliability, correlation and multiple regression analysis that are undertaken. Finally the model fit is tested to see if there is a statistically significant difference between the values predicted using the developed model and the observed values.

Chapter Six discusses and draws conclusions from the data gathered and analysed.

Chapter Seven puts forward the research study conclusions, identifies management implications, research limitations and indicates areas for future research.

### **1.3 Chapter Summary**

This chapter outlines the research rationale, the purpose and objectives of the research, the structure of the dissertation and introduced the research questions.

# Chapter Two: Literature Review

## 2.1 Introduction

The purpose of this literature review is to gain an overview of the key research models that have been used to study mobile banking adoption, identify the gaps in the literature and to formulate research questions. The objective is to examine and analyse the relevant literature in the domain, to this end articles are selected and analysed with regard to research models used and their findings in relation to the drivers of mobile banking adoption. This study will examine the attributes affecting adoption or rejection of mobile banking applications, the related barriers to adoption and the relative importance of the motives for or against adoption in an Irish context. The theoretical models posited by Rodgers, (1983) Innovation Diffusion Theory (IDT) will be discussed, followed by a discussion of Davis (1989) Technology Acceptance Model (TAM). These models will form the foundation of the theoretical framework used to explore the issues that impact on the adoption and use of mobile banking applications in Ireland. Further to this, consideration will be given to the literature concerning resistance to innovations by consumers in an attempt to uncover potential factors inhibiting or facilitating adoption of mobile banking in an Irish context as argued by Ram and Sheth (1989), Garcia et al., (2007) and Claudy et al., (2015).

Examination of the literature related to mobile banking adoption reveals that previous research studies have relied on TAM to investigate consumer's behavioural intention to adopt mobile banking. Further the literature review also indicates that perceived usefulness, compatibility, perceived risk have been found to be the most significant influencing factors on consumer's behavioural intention to adopt mobile banking (Ha et al., 2012; Shaikh & Karjaluoto, 2014).

The literature review contains the following sections:

- Discussion of the digitisation of banking services covering the areas of technological and market developments as these relate to banking services and electronic platforms.
- Discussion of what constitutes mobile banking or internet banking and the current levels of mobile banking adoption and usage.
- The Innovation Diffusion Theory model is examined and research into mobile banking adoption using this theoretical model is discussed.
- Criticisms of the research studies related to innovation adoption are discussed in the resistance to innovations section.
- The Technology Acceptance Model is examined and the related mobile banking research is discussed.
- The relationship between IDT and TAM and their complementary nature as a theoretical framework of analysis is discussed.
- Research objectives and hypotheses to be tested are identified from the literature review.

## **2.2 Digitisation of banking services**

This section will first discuss the technological and market developments as related to banking services, the electronic platforms used and some of the issues facing the financial service industry in general. Secondly, it will examine what constitutes mobile banking versus internet banking outlining some of its benefits. Finally, a discussion of its current levels of mobile banking adoption are examined.

The banking landscape is shifting due to advances in technology and changing basis of consumer relationships with banks. Bank customers no longer need to visit physical branches as they have a digital options

available to them ATM, on-line chat, mobile banking and internet banking (Citigroup, 2016).

Meuter et al., (2000) state that markets have become increasingly characterised by technology facilitated transactions between organisations and their consumers. Increasing numbers of consumers interact with technology to co-create service with organisations and these technological innovations and advances are forming a critical component of organisation-consumer interaction and will become a key component of their long term success (Meuter et al., 2000).

Maude (2008), identifies new and emerging digital distribution channels for financial services as offering opportunities to banking service providers in providing greater choice and convenience to consumers. Fintech companies are targeting the payment space with firms such as PayPal, Bitcoin or Alipay, P2P lending platforms are also multiplying and the number of Robo Investment advisors such as Nutmeg are growing (Citigroup, 2016).

Retail banking and wealth management have been fundamentally impacted as technology revolutionises the entire industry. The industry is seeing a significant investment in the payments, lending and personal finance management space by Fintech firms (Citigroup, 2016). Citigroup, (2016) forecasts that digital business models will grow from 1% of revenue in North America currently to 10% of revenues by 2020 and 17% by 2023.

In response to the entry of Fintech to the banking marketplace many incumbent banks and wealth managers now offer retail banking, investment advisory and wealth management services digitally in an attempt to satisfy consumers demand for superior products and convenience while also reducing operational costs. Banks are attempting to achieve these goals through technological innovations (Deloitte, 2014).

Electronic banking (digitisation) of the banking services involves a variety of platforms: internet, telephone, mobile phone, smartphone, tablet PC's and personal computers. Maude, (2008) contends that both retail and private banking services have embraced internet technologies and their potential to reduce costs, open up new distribution and network opportunities, increased levels of transparency for consumers enabling product and service comparisons. Further Maude, (2008) argues, retail and private banking service providers, have been slow to develop online or mobile offerings across their entire service offering, reflecting the preference of their client base for personal service delivery and their fear of commoditising their service offering. The success of the new digital business models rests not only on the technological capabilities of banks but also on the clients comfort receiving additional services this way (Maude, 2008).

Tracy and Srinivas, (2013) argue that one third of the banking sectors target market are currently not working with financial advisors, are dissatisfied with pricing, perceived value of the service, think that managing their own investments would yield better results, did not trust their bank and perceived the bank put their interests ahead of the client. Tracy and Srinivas, (2013) further argued that due to disruptive technology and innovation the competitive landscape of the financial services sector is anticipated to change significantly, and many firms are now targeting this non-consuming sector, and Millennials in particular, as they represent an underserved opportunity (Tracy and Srinivas, 2013). Prenskey, (2001a) identifies Millennials as the next generation of consumers and argues that they think, act and process information in a fundamentally different way to previous generations. Further Prenskey, (2001b) contends that Millennials may act as change catalysts and may bring about technology led rather than market led changes.

Christensen and Raynor, (2003) argued that good managers are faced with a dilemma that in paying attention to customer wants, investing in

their business and building distinctive capabilities, considered the traditional sources of competitive success, they run the risk of ignoring rivals with disruptive innovations. The key elements of the theory of disruptive innovation are:

1. Incumbents are improving along a trajectory of innovation
2. The pace of sustaining innovation overshoots customer needs
3. Incumbents have the capacity to respond but fail to use it
4. Incumbents flounder as a result of disruption

Christensen and Raynor, (2003) argue that it is the oversupply of performance (in excess of what customers want and can use efficiently) that enables disrupter firms to enter the market with simpler less expensive and more convenient technologies.

Financial service entities are facing into a transformational period which will redefine their roles, industry structure and the nature of competition within their industry. Incumbent market leaders may be different in the decade than they are today as agile competitors or market entrants out-manoeuvre slower more conservative market incumbents (PWC, 2014).

Mobile banking services is one of the latest technological advances that financial institutions are attempting to leverage as a distribution channel (Al-Jabri & Sohil, 2012; Shaikh & Karjaluto, 2014; Nel & Boshoff, 2014). Dash & Bhusan, (2014) contend that the integration of internet technologies and mobile networks has created new opportunities and applications for delivery of banking services; and that mobile banking provides the most ubiquitous delivery mechanism for banking services due to increased usage of smartphones and tablet PC's. The increasing importance placed on mobile banking as a potential service delivery channel is due to mobile devices overtaking desktop PC's as the most common personal computing interface (Lee et al., 2013). Thus the attempt by financial institutions to extend internet banking and other

banking services to mobile devices is both a logical and appropriate development in electronic banking (Dash & Bhusan, 2014).

Mobile banking offers a new way to access financial services and mobile applications on smartphones and mobile devices are expected to significantly change the business model (Kearney, 2012; Moser, 2014; Shaikh & Karjaluo, 2014). The proliferation of smartphones has increased the demand for mobile banking services, prompting financial service providers to create new services and mobile applications targeting this new demand. These mobile services and applications are intended to attract new customers, increase customer retention rates, reduce costs, improve efficiency and grow market share (Shaikh & Karjaluo, 2014). However, despite these benefits, research indicates that only 15% of mobile subscribers are expected to use mobile banking globally by 2017 (Shaikh & Karjaluo, 2014).

### **2.3 Mobile Banking Services**

Mobile banking is a variant of electronic banking services that offers similar services and benefits to consumers as internet banking but mobile banking represents enhanced “anywhere anytime” banking services over other banking channels. The benefits of mobile banking include: Immediacy, Location, Convenience, Customization, Identifiability, Ubiquity and Functionality (Ha et al., 2012). Mobile banking and internet banking share many common services, functions and benefits but there are perceived differences between the customer value propositions of both services (Laukkanen, 2007). Internet banking is still the preferred channel for account access and basic banking transactions (Nel & Boshoff, 2014) and the expected rapid growth in mobile banking usage has not materialised over the past decade (Accenture, 2013; Shaikh & Karjaluo, 2014; Yu, Li, & Chantatub, 2015) which can be attributed to the view that mobile banking is not perceived as a trusted channel for banking transactions (Ernst and

Young, 2012; Nel & Boshoff, 2014). In the United States the rate of mobile banking adoption stood at 20% in 2011 and had increased to 33% by 2013 (Ragusa, 2013). The mobile banking adoption rate in Ireland stands at 29% (Banking & Payments Federation Ireland, 2015) mirroring findings in the United States (Ragusa, 2013). Its growth rate relative to other mobile services such as instant messaging and micro blogging means that mobile banking can be considered a slow-diffusion innovation or resistant innovation (Garcia et al. 2007; Yu et al. 2015). As a resistant innovation, mobile banking has displayed persistent issues related to its adoption and use (Shaikh & Karjaluo, 2014).

Scholars generally identify mobile banking as a separate channel of electronic banking, (which also covers ATM's, point of sales terminals, interactive voice response and the internet), through which consumers can execute financial and non-financial transactions (Shaikh & Karjaluo, 2014; Nel & Boshoff, 2014, Talukder, Quazi & Sathye, 2014; Yu, et al. 2015).

Table 1 lists the mobile banking functions performed via mobile devices such as accessing bank accounts, checking account balances, executing balance transfers, payments, stock transaction execution or receiving price and portfolio performance information (Laukkanen, 2007; Shaikh & Karjaluo, 2014; Nel & Boshoff, 2014, Talukder et al. 2014; Yu et al., 2015).

Table 1 details the services provided through the mobile banking channel.

Financial	Non-Financial
Payments	Balance enquiry
Peer-to-Peer Payments	Mini Statements
Balance Transfers	PIN Change
Remittance	Check book request
Shopping or Donations	Due alerts
Mobile Balance top up	Location of ATM

**Table 1: Services Provided through the Mobile Banking Channel (Shaikh & Karjaluo 2014).**

Shaikh & Karjaluo, (2014) defined mobile banking as a product or service offered by a bank for conducting financial and non-financial transactions using a mobile device. Shaikh & Karjaluo, (2014) identify four methods through which consumers can access mobile banking services, three require an internet connection while the fourth relies on Global System for Mobile Communication (GSM): First mobile applications downloaded to a smartphone, second applications downloaded to a tablet PC, third web browsers used on mobile or smartphones, finally short messaging services (SMS).

Fiserv (2016) state the benefits of mobile banking adoption for financial institutions include:

- Lower customer attrition rates
- Expanded product usage following mobile banking adoption
- Increased levels of transaction execution and transaction frequency post adoption by mobile banking users
- Higher average revenue earned from mobile banking users versus non-users. This is partly due to increased transaction levels of mobile banking users and increased number of products held by mobile banking consumers.

Fiserv (2016) findings indicate mobile banking has the potential to increase revenue for those institutions that offer the service.

Banking Payments Federation Ireland (BPF) Report Q4 (2015), considers online banking and mobile banking as separate activities defining them more narrowly excluding web browsers used on mobile or smartphones from their definition of mobile banking. This represents a narrower definition than that of Shaikh & Karjaluo (2014).

Banking Payments Federation Ireland (2015) define online banking as all banking activity performed via the internet on a web browser interface regardless of the device used while mobile banking is defined as all activity executed via a dedicated application on a mobile, smartphone or tablet PC, or via SMS over a mobile network. Banking Payments Federation Ireland, (2015) identifies 3.4 million active internet and mobile bank account users, of these 29% are mobile banking service users. In Q4 2015 mobile banking account logins (50.4% of account logins) exceeded those of online banking (49.6% of account logins) through a web-browser for the first time in Ireland despite being only 29% of total internet banking and mobile banking user group. This supports the Fiserv (2016) findings that mobile banking users display increased levels of interaction and transaction execution relative to non-mobile banking users. Customers made 63.8 million online and mobile payments in 2014, 20.1 million (31.5%) mobile payments or and 43.7 million (68.5%) online payments indicating that the increased levels of interaction (account logins) have not translated into the expected increased levels of transaction by mobile banking users (Ha et al. 2012; Shaikh & Karjaluo, 2014). The levels of transaction execution have remained approximately in line with mobile banking adoption levels of 30%. The research findings illustrate the increasing demand by consumers for convenience (growth in account logins), the potential of mobile banking applications as a distribution channel for banking services (increased levels of customer interaction with banking services) and mobile banking as displaying the characteristics of a slow diffusing or resistant innovation. This highlights the need for further investigation into mobile banking adoption to help understand the key

factors influencing mobile banking adoption and its continued use for consumers', organisations and managers.

The following sections will discuss the main theories that have been adopted as theoretical frameworks to study mobile banking adoption and use by consumers along with the main criticisms of the research studies.

## **2.4 Innovation Diffusion Theory (IDT)**

Innovation Diffusion Theory (IDT) is the second most popular research model used to investigate mobile banking adoption: Shaikh & Karjaluoto, (2014) found that 16% of studies used IDT as its theoretical research framework while TAM accounted 42% of studies. IDT has been used to identify the factors that act as facilitators and inhibitors of mobile banking adoption and use (Kim et al., 2009; Lin, 2011; Al-Jabri & Sohil, 2012; Dash & Bhusan, 2014).

Rodgers (1983) IDT theory attempts to explain how over time a new idea, innovative new product or process is adopted and filters across a population or society. *"Diffusion of innovation is the process by which an innovation is communicated through certain channels over time among members of a social system"* (Rodgers, 1983, p11). Rodgers, (1983) defines an innovation as an idea, practice or product which is perceived to be new by individuals, whether the innovation is actually new is irrelevant only that the adopting individual believes it to be new. Rodgers (1983) also contends that during the innovation-decision process uncertainty is created in the minds of potential adopters but that the potential advantage to be gained from adopting the innovation acts as a motivation for the potential adopter to seek further information relating to the innovation. Through this process information is gathered in an effort to reduce uncertainty about the outcomes from adoption and identify the related advantages and disadvantages of an innovation.

The potential adopter through this learning process reduces uncertainty to a level where a decision to adopt or reject the innovation can be made; if continued use is made of the innovation it can then be evaluated (Rodgers, 1983). Adoption, within the context of IDT, is considered to have taken place when an individual does something in a different way than previously, and that for adoption to have taken place, the individual must have perceived the idea, behaviour or product as new or innovative (Rodgers, 1983).

#### 2.4.1 Innovation attributes

Rodgers (1983) states that the perceived attributes of an innovation are key factors that influence adoption behaviour and include: relative advantage, compatibility, complexity, trialability and observability.

Rodgers (1983) argued that innovations perceived as having greater levels of these attributes would be adopted at an accelerated rate in comparison to those that are not. The following is a summary of Rodgers five identified attributes:

- Relative Advantage concerns the extent to which the innovation is identified as representing a gain in efficiency relative to the current process, procedure or product (Moore and Benbasat, 1991). Rodgers (1983) posits while benefits can be measured in economic terms, other factors such as social status, convenience and satisfaction are also important. Rodgers, (1983) argued that it was less important that an innovation had any real objective advantage only that it was perceived as having one by the adopting individual; the greater this perception the more rapid the adoption of the innovation would be. Research by Moore and Benbasat, (1991) has shown that the rate of adoption and relative advantage of an innovation are positively correlated. Relative advantage was found to have a significant positive influence on mobile banking adoption in studies that employed

IDT as the foundation of their theoretical framework (Kim et al., 2009; Lin, 2011; Al-Jabri & Sohil, 2012; Dash & Bhusan, 2014).

- Compatibility concerns the perception that an innovation is consistent with existing values, norms and needs of potential adopters (Rodgers, 1983). If the innovation is inconsistent with the norms or values of the social system its adoption will be slower than one which is compatible; where incompatible a new value system may be required before adoption will take place (Rodgers, 1983). Compatibility was seen to have a significant impact as a determinant for prediction of mobile banking adoption (Kim et al., 2009; Lin, 2011; Ha et al. 2012; Al-Jabri & Sohil, 2012; Dash & Bhusan, 2014).
- Complexity involves the perception that an innovation is difficult to use (Rodgers, 1983). Easy to understand new concepts or simple to use innovative processes and products are adopted more rapidly than those that require the attainment of new skills and knowledge to use (Rodgers, 1983). Complexity was found to have a negative influence on the intention to adopt mobile banking (Kim et al., 2009; Lin, 2011; Ha et al. 2012; Al-Jabri & Sohil, 2012; Dash & Bhusan, 2014).
- Trialability concerns the ability to experiment with and use an innovation before adoption (Rodgers, 1983). When potential adopters of new innovations have the opportunity to trial and experience the innovations this can have a positive effect on their desire to adopt the innovation as it offers the opportunity to reduce uncertainties associated with its adoption (Rodgers, 1983). Trialability was found to have a significant effect on mobile banking adoption in some studies (Dash & Bhusan, 2014) while appearing to be an insignificant factor in others (Al-Jabri & Sohil, 2012).

- Observability relates to the visibility of the innovation and its potential benefits to members of a social system; the more visible the benefits are to others the more likely the innovation is to be adopted (Rodgers, 1983). In the research on mobile banking adoption observability is seen to have a significant effect on adoption intentions (Kim et al., 2009; Lin, 2011; Ha et al. 2012; Al-Jabri & Sohail, 2012; Dash & Bhusan, 2014).

#### 2.4.2 Categories of Innovation adopters

Rodgers (1983) argued that there are five categories into which individuals can be categorised based on their innovativeness. This innovativeness is a function of their willingness to adopt new ideas relative to other individuals. The five categories identified by Rodgers (1983) are depicted in Figure 1 including:

- Innovators: made up of individuals who actively seek out new ideas. This category of individuals are comfortable with uncertainty related to the adoption of the innovation.
- Early adopters: this category includes role models for the social system as many in the social system will look to these early adopter for feedback and information related to their experience with the innovation. Through this dissemination of information related to the innovation the early adopter category reduce uncertainty related to the adoption of new innovations.
- Early majority: these individuals adopt innovations slightly quicker than the average social system member but adopt new ideas at a slower pace than early adopters.
- Late majority: these individuals adopt new innovations at a slower pace than the average social member and tend to wait until uncertainty has been removed from the adoption decision.

- Laggards: these individuals are the last to adopt a new idea or innovation taking the longest to make the innovation adoption decision.

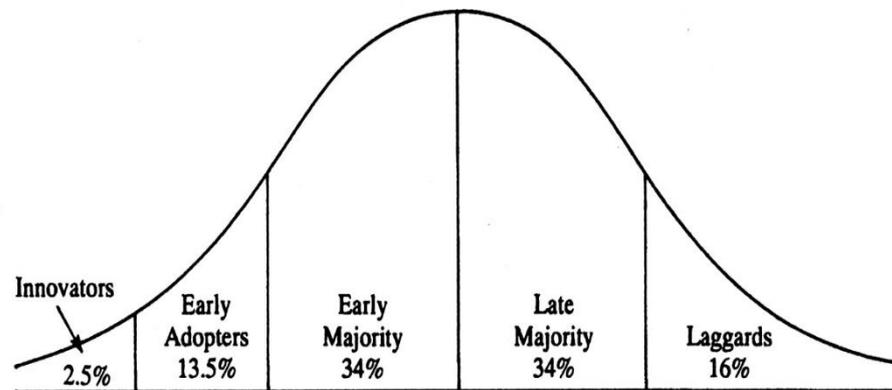


Figure 1: Categories of Adopters (Rogers, 1995, p.262)

## 2.5 Resistance to Innovation

Criticism of the research into innovation adoption using IDT and TAM models has centred its focus on the decision stage of the adoption process (Claudy et al. 2013). The research has displayed a bias towards evaluation of an innovation's attributes and their influence on a potential adopter resulting in either a positive or negative attitude towards it which directly affects their adoption decision. Research has tended to neglect the study of factors that lead consumers to resist the adoption of an innovation which may be of greater benefit to managers (Claudy et al. 2013).

Claudy et al. (2013) argue that these resistance reasons are not necessarily the opposite of adoption reasons and that consumers may recognise the relative advantage and usefulness of an innovation and yet still resist its adoption due to their perception of adoption barriers such as perceived risk, social influence/image or perceived cost. Garcia et al. (2007) point to examples of innovations that have displayed slow

diffusion patterns, such as the dishwasher which took half a century to become a mainstream product.

Claudy et al (2015) state that estimates across product categories show that 40-90% of innovations never become commercial successes. Often these slow take-off innovations or product failures are attributed to high introductory prices, uncompetitive low quality products, or failure to develop niche markets. Garcia et al. (2007) argue that what is actually occurring can be attributed to consumer resistance to innovation; and categorised innovations as either receptive or resistant. Receptive innovations are welcomed, do not require significant changes in consumer beliefs, attitudes or routines; they do not require large departures from the status quo when adopted. Resistant innovations require large deviations from a status quo which the consumer may already find satisfactory, even when they have clear advantages over existing products or services. In adopting these innovations the consumer will have to learn new habits, routines and adopt new values. These innovations will have a psychological and economic cost component for the consumer (Ram & Sheth, 1989; Garcia et al. 2007). Both of these constructs of receptive and resistant innovations align with the concept of compatibility from IDT that predicts that the lower the perceived compatibility an innovation has with a potential adopter's lifestyle the low its adoption and use will be.

Ram and Sheth, (1989) identify five barriers to consumer's adoption of an innovation which can be grouped into two categories:

Functional barriers concern usage, value and risk barriers that consumers may associate with an innovation and include:

1. Usage barriers - innovation is incompatible with current workflows and methods. Innovations that require consumers to change their habits, practices and routines will be adopted over relatively long period, if at all.

2. Value barriers – consumers do not comprehend the value of the innovation, they do not understand the performance to price ratio when compared to existing substitutes.
3. Risk barriers – consumers may view the innovation as risky and will postpone adoption until they can mitigate the risk through either knowledge gained (trialability) or experience of others (observability). This risk presents in four ways: physical risk, economic risk, performance or functional risk and social risk.

Psychological barriers are barriers that consumers experience when an innovation requires them to change existing beliefs, traditions and norms (social influence) (Ram & Seth, 1989).

4. Tradition barriers exist when the innovation requires the adopter to deviate from traditional norms it is likely to be resisted.
5. Image barriers exist when innovations will inherit certain identity attributes associated with its origin. Negative image deserved or undeserved will act as a barrier to adoption.

Perceived risk is a factor that scholars have used to extend IDT. Meuter et al., (2000) argue that technology can potentially provide benefits to both customers and firms; however the spread of technology into what were previously interpersonal interactions, between customers and the service provider's employee's, has raised issues surrounding privacy, confidentiality and data protection. This can cause potential adopters of new innovations to be wary. Ram and Sheth, (1989) contend that perceived risk describes the degree of risk in using innovations. The perception of risk by consumers is usually due to doubts relating the degree of inconsistency between consumer's judgement and real behaviour; and the innovations failure to deliver the anticipated outcome and its consequent loss. Al-Jabri and Sohail, (2012) posit that when considering mobile banking this perceived risk is even higher due to issues surrounding privacy and security concerns, including such things as the loss of PIN codes, passwords, hackers, the loss of the mobile

device itself and any stored data. Therefore it can be concluded that perceived risk will have a negative effect on mobile banking adoption. The research indicates that perceived risk will have a significant effect on mobile banking adoption (Al-Jabri & Sohil, 2012; Ha et al. 2012).

A review of the existing literature into the factors influencing the diffusion and adoption of mobile banking reveals that the attributes of compatibility and observability will have a significant positive impact, relative advantage and trialability will have a positive effect, perceived risk will have a significant negative effect and complexity will also negatively impact adoption (Dash & Bhusan, 2014; Al-Jabri & Sohil, 2012; Kim et al., 2009; Lin, 2011; Ha et al. 2012; Shaikh & Karjaluoto, 2014).

## **2.6 Technology Acceptance Model**

Shaikh & Karjaluoto, (2014) found that TAM accounts for 23 (42%) of the 55 studies they reviewed into mobile banking adoption and can be considered the most common research model employed in mobile banking research. TAM has been widely utilised as model for explaining user acceptance of new technologies or information systems; it is seen as one of the best models as it has been broadly tested and validated (Ramlugun & Issuree, 2014) and has the added advantage that it can be easily adapted or extended using other theoretical constructs (Venkatesh & Davis, 2000). This has led to its adaptation and use by researchers investigating determinants of adoption and use of new technology and information systems (Venkatesh et al. 2003).

TAM is adapted from the Theory of Reasoned Action (TRA) (Tung et al., 2014). TRA endeavours to understand the voluntary behaviour of individuals and what motivates these actions. It contends that intention precedes action and that this behavioural intention is the result of expectations that the behaviour will result in a specific outcome.

Behavioural intention is “*jointly determined by an individual’s attitude towards a particular behaviour and subjective norms concerning the behaviour*” (Ajzen & Fishbein, 1980, p.6). TRA argues that behavioural intention is a measure of the strength of intention to perform a behaviour, as such the greater the behavioural intention the greater the effort to perform a specific behaviour for an individual which in turn increases the chances of a behaviours performance. Ajzen and Fishbein (1980) argue that two factors influence intentions, attitudes and subjective norms. Attitudes are a function of beliefs, when an individual believes that by performing a behaviour a positive outcome will accrue to them, they will hold a favourable attitude to performing the behaviour; when an individual believes that the performance of the behaviour will result in a negative outcome they will have an unfavourable attitude towards the behaviour performance (Ajzen & Fishbein, 1980). TRA contends that an individual’s attitude towards a specific behaviour is a function of their belief as to consequences of performing the behaviour and their expectation that by performing the behaviour a positive or negative outcome will be the result for them (Tung et al., 2014; Davis et al., 1989).

TAM was originally developed to be applied in the study of the human-computer interactions and was founded on the concepts of perceived ease of use (PEOU) and perceived usefulness (PU). Perceived ease of use is associated with the expectation of the user that a technology will be easily learnt and this learning easily applied; perceived usefulness is associated with the expectation that by adopting the new technology the user will benefit through its use (Davis, 1989).

TAM asserts that these two beliefs of perceived usefulness (PU) and perceived ease of use are (PEOU) are the most significant factors in technology acceptance behaviour and as such are the best indicators of current usage and predicted future usage (Davis, 1989). Perceived usefulness according to Davis (1989) had a significantly greater correlation to usage behaviour than perceived ease of use.

Davis, (1989) asserts that users “*are driven to adopt an application primarily because of the functions it performs for them, and secondarily for how easy or hard it is to get the system to perform those functions*” (Davis, 1989 pp. 333). Davis, (1989) findings indicate individuals either adopted or rejected applications they expected would increase their ability to perform a task (PU), the greater the PU of a new technology the greater the probability it will be adopted. Additionally they would either adopt or reject the application based on their perception as to how difficult it was to use (PEOU). However, individuals will endure higher levels of difficulty in use where an application provides critical functions necessary to perform a task. While this can deter the adoption of an application that is perceived as useful, no amount of PEOU will compensate for an application with little or no PU (Davis, 1989). The theory asserts that PU and PEOU are important factors in determination of user adoption but it does not take account of other external factors and is often extended and adapted to overcome this drawback (Shaikh & Karjaluoto, 2014).

Research indicates that TAM is the most often used theoretical model to investigate mobile banking adoption with respect to different dimensions (Ha et al., 2012; Shaikh & Karjaluoto, 2014). Their research also indicates that there is divergence in scope and a convergence of focus. Ha et al., (2012) identify fifteen separate variables that have been considered as drivers of mobile banking adoption. Ha et al., (2012) argue that the drivers that display the most significant influence on mobile banking adoption are perceived usefulness, perceived ease of use, compatibility and perceived risk. Shaikh & Karjaluoto, (2014) posit that perceived trust and self-efficacy should be added to this list of important drivers of mobile banking adoption.

- Perceived usefulness is identified as the strongest of the drivers that influence mobile banking adoption in the research. Previous studies suggest that users will adopt the technology if it is perceived to be superior to existing channels and will continue

usage if their perceived usefulness is proven through initial use of mobile banking (Ha et al., 2012; Shaikh & Karjaluoto, 2014; Laukkanen, 2007; Lee et al., 2013; Talukder et al. 2014; Yu et al. 2015; Koksai, 2016; Alalwan, Dwivedi, Rana & Williams, 2016; Ramlugun & Issuree, 2014).

- Perceived ease of use is also identified as having a significant influence on user intention for adoption and use of mobile banking (Talukder et al. 2014; Shaikh & Karjaluoto, 2014; Yu et al. 2015; Ramlugun & Issuree, 2014; Koksai, 2016; Alalwan et al., 2016).
- Perceived risk relates to the types of risk users attribute to the use of mobile banking such as data hacking, stolen handsets and unsuccessful transaction execution (Ha et al., 2012). Research studies indicate that this will have a significant negative impact on user intentions to adopt and use mobile banking (Al-Jabri & Sohail, 2012; Ramlugun & Issuree, 2014; Talukder et al. 2014; Shaikh & Karjaluoto, 2014; Koksai, 2016; Alalwan et al., 2016) and is seen as the second most important driver by Ha et al., (2012) in their review of the literature related to mobile banking adoption.
- Compatibility relates to the ease of adoption of mobile banking from the users' perspective (Ha et al., 2012). It originates in IDT as posited by Rodgers (1983) and relates to the perception that an innovation (e.g. mobile banking) is consistent with existing values, norms and needs of users. The innovation will be perceived as compatible if no substantive changes are required in the user's lifestyle in order to use the innovation (e.g. mobile banking). The results indicate that compatibility will significantly influence user's intention to adopt and use mobile banking services (Al-Jabri & Sohail, 2012; Dash & Bhusan, 2014; Ha et al., 2012; Lin, 2011; Shaikh & Karjaluoto, 2014; Koksai, 2016).
- Perceived trust is not only an important factor in mobile banking adoption but its continued use (Kim, Shin & Lee, 2009; Nel & Boshoff, 2014; Koksai, 2016). Kim et al., (2009) study of the

dynamics between initial trust and usage intentions of mobile banking considered four types of trust inducing forces: institutional offering (structural assurances), cognition (perceived benefits), personality (personal propensity), and firm characteristic (firm reputation). Their findings indicated that three variables (relative benefits, propensity to trust, and structural assurances) had a significant influence on initial trust of mobile banking; further initial trust and relative benefits was vital to the promotion of personal intention to use mobile banking. Talukder et al., (2014) posit that in mobile banking trust is dependent on the user acceptance of internet technologies as a vehicle for the execution of financial transactions and recognition of the financial institution as reliable; this dependence on technology for transaction execution creates uncertainty making trust a crucial component of mobile banking. The associated risks are identified as the risk of monetary loss as the user must rely on electronic information which maybe incomplete or distorted , risks associated with loss of privacy related to personal data exchanged over the web, and risks associated with data security. Trust for users of mobile banking is only created by the minimisation of associated risks to a tolerable level for the user. The research indicates a significant relationship between trust and intention to use mobile banking (Talukder et al. 2014; Koksai, 2016).

- Self-efficacy relates to the concept that when a consumer has the ability to perform a task (skills required to use an innovation) there is a higher probability that they will accept and use it (Ramlugun & Issuree, 2014; Koksai, 2016; Alalwan et al., 2016). Research has indicated that perceived self-efficacy has significant impact on the intention to adopt and use an information system (Agarwal et al., 2000; Venkatesh & Davis, 2000). Ramlugun & Issuree, (2014) study found that there was a positive relationship between perceived self-efficacy and intention to use mobile banking; further they found that the

greater the perception of successfully performing mobile banking the higher the adoption rate will be.

## **2.7 IDT and TAM relationship**

IDT identifies five significant innovation qualities: relative advantage, compatibility, complexity, trialability and observability. Crossover exists between TAM and IDT and each has been seen as complementary to each other as research models (Tung et al., 2014). Previous studies have found that relative advantage of IDT is similar to perceived usefulness in TAM (Venkatesh et al. 2003), while complexity in IDT is similar to perceived ease of use in TAM (Moore and Benbasat, 1991). It is proposed that this research study will utilise an integrated theoretical framework that blends the Technology Acceptance Model with Innovation Diffusion Theory in order to develop a research model composed of six innovation attributes (perceived usefulness, perceived ease of use, compatibility, perceived risk/credibility, self-efficacy, perceived trust) expected to influence consumer intention towards mobile banking adoption. The reasons for the selection of these attributes are that the existing literature indicates that these represent most significant drivers of intention towards mobile banking. Perceived usefulness, Perceived ease of use and compatibility are seen to be most significant factors in the literature, while those of self-efficacy and perceived trust have a positive but less significant impact on adoption intentions, and perceived risk has a significant negative impact. Trialability and observability are excluded from the study as previous research indicates that there is little correlation between IT adoption and these constructs (Tung et al., 2014).

## **2.8 Conclusion**

The literature review discusses the most salient aspects that have been examined by previous researchers. The studies that have been

included in the review have investigated and identified the factors most influential to the adoption of mobile banking. The vast majority of these investigations have been conducted using quantitative research while only one paper undertook a qualitative approach. The regional spread of the studies concentrated in developing nations covering the Far East, Middle East, Africa and Latin America. With only three studies identified as carried out in developed nations such United States of America, Germany, Australia and Finland (Shaikh & Karjaluoto, 2014). The majority of the studies carried out have adopted TAM or IDT as their theoretical framework to conduct their analysis. These findings align with reviews conducted by Shaikh & Karjaluoto, (2014) and Ha et al., (2012).

The research studies have recommended ways to assist increasing mobile banking adoption such as dedicated marketing programs to generate positive attitudes to mobile banking. The literature indicates that this should focus on the benefits of mobile banking, its usefulness (Ha et al., 2012; Shaikh & Karjaluoto, 2014; Laukkanen, 2007; Lee et al., 2013; Talukder et al. 2014; Yu et al. 2015; Koksai, 2016; Alalwan et al., 2016; Ramlugun & Issuree, 2014) and compatibility with user's lifestyles (Al-Jabri & Sohail, 2012; Dash & Bhusan, 2014; Ha et al., 2012; Lin, 2011; Shaikh & Karjaluoto, 2014; Koksai, 2016) while also emphasising risk minimisation (Al-Jabri & Sohail, 2012; Ramlugun & Issuree, 2014; Talukder et al. 2014; Shaikh & Karjaluoto, 2014; Koksai, 2016; Alalwan et al., 2016) and increasing level of trust for user (Talukder et al. 2014; Koksai, 2016). One of the most important factors influencing mobile banking adoption has been identified as trust.

The literature examines several different independent and dependant variables related to the users' adoption decision process. Of these the main dependant variables include attitude, intention and usage; while the main independent variables include perceived usefulness, perceived ease of use, compatibility, perceived risk, trust, and self-efficacy. Of these drivers of potential mobile banking adoption those of

perceived usefulness, compatibility and trust have been found to be the most important.

The research has also focused almost entirely on SMS banking with no studies found that addressed more developed mobile banking applications available on smartphones or tablet PC's (Shaikh & Karjaluoto, 2014). This may have been the result of the focus the research studies had on developing nations where smartphone and tablet PC ownership is not widespread and poor 3/4G network coverage exists. This represents a gap in the literature which this study will try to fill.

## **2.9 Research aim**

The growth of mobile banking services in recent years, as evidenced in BPFi Report Q4 (2015), points to its potential as an important distribution mechanism for banking services. There has been a dearth of research studies investigating the factors affecting mobile banking application adoption, nor has there been a study testing the relative influence of reasons for and against adoption in an Irish context. This study proposes to fill that gap and will attempt to examine a number of factors affecting mobile banking application adoption.

The next chapter will draw together the literature from the areas examined in the literature review to create a conceptual framework which guides and directs the research study.

## **Chapter Three: Conceptual Framework**

### **3.1 Introduction**

The objective of this research study is to analyse the factors influencing the consumer's decision process in relation to the adoption or rejection of mobile banking applications in the Irish marketplace.

The second chapter of the research study reviewed the literature relating to the digitisation of banking services, mobile banking services, the Innovation Diffusion Theory, the Technology Acceptance Model and resistance to innovations. This chapter will draw together the literature from these areas to create a conceptual framework for the research. The conceptual framework will aid in the identification of important factors from the literature and will inform the research and analysis throughout this research study (McGovern, 2009).

### **3.2 Conceptual Framework**

Shaikh & Karjaluoto (2014), argue the two main theories utilised to study mobile banking acceptance are the Technology Acceptance Model (Davis, 1989), the Innovation Diffusion Theory (Rodgers, 1995). TAM focuses on the underlying characteristics of the technology, its perceived usefulness and perceived ease of use. IDT focuses is the five characteristics of an innovation: relative advantage, complexity, compatibility, trialability and observability (Rodgers, 1983). Relative advantage, compatibility and complexity have been found in previous research to be the only relevant factors associated with innovation adoption or mobile banking adoption (Agarwal & Prasad, 1998; Shaikh & Karjaluoto, 2014).

The literature review highlighted the preference of researchers towards the use of the classic adoption theories or a combination of them when

conducting their research (Shaikh & Karjaluoto, 2014). IDT and TAM have previously been combined to conduct research into mobile banking adoption (Koenig-Lewis et al., 2010; Al-Jabri & Sohil, 2012; Shaikh & Karjaluoto, 2014). Additionally the literature review indicates that mobile banking adoption is determined by individual factors not only the technologies features and perceived innovation characteristics (Ha et al. 2012; Shaikh & Karjaluoto, 2014). Based on this reasoning it was decided to use an integrative approach combining classic adoption and use theories such as TAM and IDT to facilitate a better understanding of adoption and use of mobile banking applications in the population of Ireland.

The conceptual framework here draws primarily on TAM while integrating factors from IDT. TAM was chosen as the primary model as it is identified as the most commonly employed theory in the literature review appearing in 42% of the studies (Shaikh & Karjaluoto, 2014) and is a recognised and referred to theory (Venkatesh & Davis, 2000).

Shaikh & Karjaluoto (2014) state that mobile banking adoption has been tested in studies using a model that combined TAM with IDT. As TAM excludes economic, demographic and other external factors it is seen as limited in its ability to explain user's intentions and attitudes towards mobile services adoption (Venkatesh & Davis, 2000). To compensate for this shortcoming many of the studies into mobile banking adoption have extended TAM to include the constructs of relative advantage and compatibility from IDT (Shaikh & Karjaluoto, 2014). TAM further ignores constructs related to perceived risk, perceived trust and self-efficacy, thus the addition of these to the research framework will ensure that barriers to adoption are taken into consideration also (Shaikh & Karjaluoto, 2014).

TAM and IDT are used in this research as the primary theoretical framework for the conceptual model proposed and will be integrated with perceived risk, perceived trust and self-efficacy.

### 3.2.2 Conceptual framework

This study integrates TAM, which focuses on the characteristics of the technology, its perceived usefulness and perceived ease of use with four additional factors compatibility form IDT and perceived risk, perceived trust and self-efficacy identified in the literature.

The factors chosen examine different features that help to predict consumer intention towards mobile banking applications. The identified variables include:

- Technology characteristics of perceived usefulness and perceived ease of use
- Innovation attribute of compatibility with lifestyle, experiences, values and beliefs
- Barriers to adoption including perceived risk and perceived trust.
- Technological readiness of adopters is measured by self-efficacy, the consumers ability to use the technology

Table 2 identifies factors selected for inclusion in the conceptual framework.

Acceptance theory	Factor Selected
Technology Acceptance Theory	Perceived usefulness, Perceived ease of use
Innovation Diffusion Theory	Compatibility
Mobile banking	Perceived risk, Perceived trust, self-efficacy

**Table 2: Factors included in conceptual framework**

### 3.2.3 Concept measures

The theoretical frameworks employed in this research are developed from the concepts identified in the literature review, which are then adapted to the mobile banking context as required. Perceived

usefulness is adapted from Davis (1989), Gu et al., (2009) and Lee, (2009). Perceived ease of use is adapted from Davis (1989), Gu et al., (2009) and Luarn & Lin, (2005) and Venkatesh & Davis, (1996). Compatibility items are adapted from Gerard & Cunningham (2003) and Lin (2011). Perceived risk measurements are adapted from Featherman & Pavlou, (2003) and Kim, Prabhakar and Park, (2009). Trust is derived from Gu et al., (2009) and Lee & Chung, (2009). Perceived self-efficacy is adapted from Tan & Teo, (2000) and Wang & Wang, (2008). Behavioural intention is adapted from Gu et al., (2009), Lee, (2009) and Luarn & Lin, (2005).

### **3.3 Research Questions**

#### **3.3.1 Perceived usefulness**

Drawing on TAM, it is proposed that perceived usefulness and perceived ease of use will directly impact individuals intention to use mobile banking and by extension its actual use. Previous studies show that perceived usefulness is the most important of drivers influencing mobile banking adoption and that if the perceived usefulness is proven through initial use, creating the perception of the channel as superior, will lead to continued usage (Laukkanen, 2007; Ha et al., 2012; Lee et al., 2013; Ramlugun & Issuree, 2014; Talukder et al. 2014; Shaikh & Karjaluto, 2014; Yu et al. 2015; Koksai, 2016; Alalwan et al., 2016). The following hypothesis is therefore developed:

H1. Perceived usefulness will have a positive impact on behavioural intention to use mobile banking mobile banking.

#### **3.3.2 Perceived ease of use**

Previous studies illustrate a positive relationship between perceived ease of use and the intention to adopt mobile banking (Ramlugun & Issuree, 2014; Talukder et al. 2014; Shaikh & Karjaluto, 2014; Yu et al.

2015; Koksal, 2016; Alalwan et al., 2016;). The researcher posits that if mobile banking is easy to learn and use, individuals' intention to adopt it will be positively impacted. The following hypothesis is developed:

H2. Perceived ease of use increases the behavioural intention of individuals to adopt mobile banking.

### 3.3.3 Perceived risk

Pavlou (2003) states that perceived risk is the conviction of potential adopters that they may fail to achieve a target. Ram and Sheth (1989) contend perceived risk refers to the degree of risk in using innovations. Riquelme and Rios (2010) state that the perception of risk related to mobile applications is greater due to the possibility of the loss or theft of mobile devices. Al-Jabri and Sohail, (2012) argue that in the case of mobile banking adoption perceived risk is even higher due to issues surrounding privacy and security concerns. Research indicates that perceived risk will have a significant effect on mobile banking adoption (Al-Jabri & Sohail, 2012; Ha et al. 2012). Therefore the following hypothesis is developed:

H3. Perceived risk will have a negative effect on behavioural intention to adopt mobile banking.

### 3.3.4 Perceived compatibility

Rodgers (1983) states that compatibility concerns the perception that an innovation is consistent with existing values, norms and needs of potential adopters. Consumers with no previous experience in using mobile banking may perceive it as difficult to use leading to a perception that it is incompatible with their lifestyle. This perceived lack of compatibility of mobile banking with individuals needs may negatively affect the behavioural intention to adopt mobile banking. The lower the perceived compatibility an innovation has with a potential adopter's

lifestyle the lower its adoption and use will be. The literature indicates that perceived compatibility is a strong driver on intention to adopt mobile banking. Compatibility was seen to have a significant impact as a determinant for prediction of mobile banking adoption (Kim et al., 2009; Lin, 2011; Ha et al. 2012; Al-Jabri & Sohil, 2012; Dash & Bhusan, 2014;). This research also predicts that compatibility will have direct impact on consumers' behavioural intention to use mobile banking.

H4. Compatibility will have a positive effect on behavioural intention on to adopt mobile banking.

### 3.3.5 Perceived Trust

The literature review indicates that there exists a significant relationship between perceived trust and behavioural intention to use mobile banking (Talukder et al. 2014; Koksai, 2016). Trust is found in the literature to significantly influence mobile banking adoption and its continued use (Kim et al., 2009; Nel & Boshoff, 2014; Koksai, 2016). Koksai (2016), argues that the role of trust is amplified in the presence of risk and they are reinforcing components of decision making. Trust once established will reduce perceived risks and uncertainty increasing intention to adopt mobile banking. Trust in mobile banking depends on the user acceptance of internet technologies for the execution of financial transactions and recognition of the financial institution as reliable; this dependence on technology for transaction execution creates uncertainty making trust a crucial component of mobile banking (Talukder et al. 2014). The following hypothesis is developed:

H5. Trust will have a positive effect on behavioural intention to adopt mobile banking.

### 3.3.6 Self-efficacy

Self-efficacy in the context of mobile banking can be defined as the perception of one's ability to use mobile banking (Koksal, 2016). Research has shown a positive relationship between perceived self-efficacy and mobile banking adoption, the probability of individuals adopting mobile banking increases when they believe they have the ability to use it (Ramlugun & Issuree, 2014; Koksal, 2016; Alalwan et al., 2016). Therefore the following hypothesis is developed:

H6. Self-efficacy will have a positive effect on behavioural intention to adopt mobile banking.

### 3.4 Model Development

The new extended TAM and IDT conceptual model developed and tested this study is shown in Figure 2.

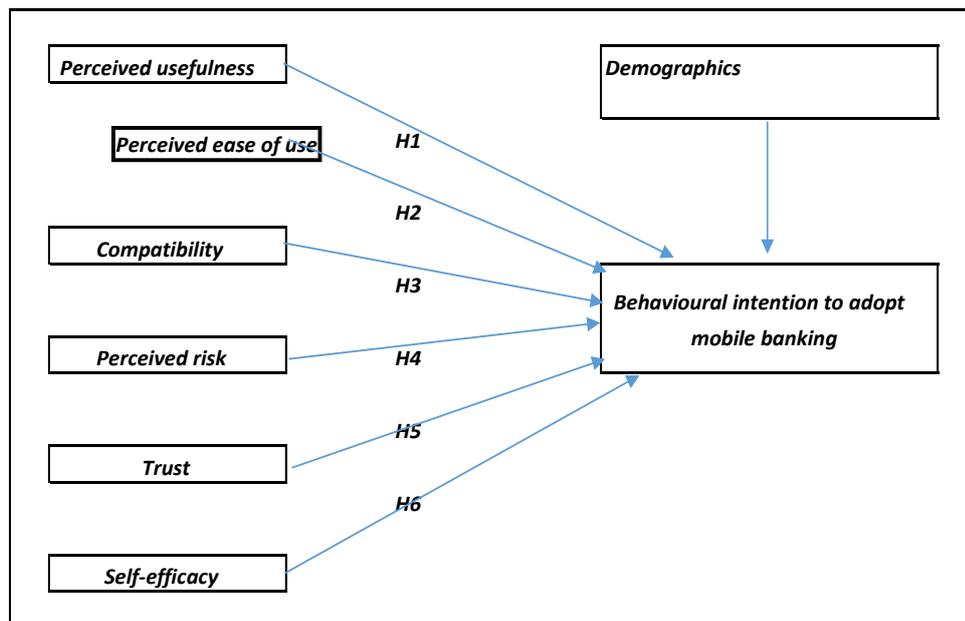


Figure 2: The Conceptual Framework

This displays the independent variables that are examined to determine their influence on the dependent variable, the consumer's behavioural intention towards mobile banking.

Multiple regression models are used to predict a dependent variable based on multiple independent variables, this allows the researcher to determine the overall fit of (variance explained) of the model and the contribution of each of the predictors to the total variance explained (Laerd Statistics, 2015d). Considering the six independent variables "X<sub>1</sub>" through "X<sub>6</sub>" and one dependent variable Y in the conceptual model proposed in the research a multiple regression model can be estimated as follows:

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + e$$

Where b<sub>0</sub> is the sample intercept (constant), and b<sub>1</sub> to b<sub>6</sub> is the sample slope parameter for X<sub>1</sub> through X<sub>6</sub>, while e represents the sample errors/residuals. Substituting for the proposed models independent variables and the dependent variable the above formula can be rewritten as:

$$BI = B_0 + B_1 (PEOU) + B_2 (COM) + B_3 (PU) + B_4 (PR) + B_5 (PTRU) + B_6 (SE) + e$$

This is the linear equation for the proposed conceptual model.

It was decided to split the relatively large sample of 240 respondents into two randomly chosen sample groups. The first group of randomly selected respondents was used to develop the proposed conceptual model investigating the association between the dependent variable behavioural intention (BI) and independent variables perceived usefulness (PU), perceived ease of use (PEOU), compatibility (COM), perceived risk (PR), perceived trust (PTRU) and self-efficacy (SE). The second group was then used to test the model fit. This was achieved by testing the behavioural intention values predicted by the model developed and the actual observed values from the survey instrument. This represents a practical test of the model fit.

### **3.4 Chapter Summary**

This chapter developed a conceptual framework adapted from the theoretical concepts from TAM, IDT and mobile banking literature. This framework drew all the related factors from the mobile banking literature which will form the basis of the questionnaire design. Additionally the hypotheses that are to be tested were identified. The next chapter discusses the various methodologies which can be employed when undertaking research and differing approaches to how data can be collected and analysed.

## Chapter Four: Research Methodology

This chapter will explain the methodology and approach taken in the research for the collection and analysis of the data. Further the chapter will describe the philosophical basis and design of the research.

This chapter first defines the research framework adopted by the researcher. Secondly it discusses the two main research philosophies, positivism and interpretivism in information technology research. Further a comparison of deductive and inductive techniques, as well as qualitative and quantitative research and time horizons is undertaken. Thirdly it discusses the research methods within the mobile banking adoption research arena. Fourth it deals with the research methods adopted in this study. Fifth it describes the timeline for data collection, next the ethical considerations are discussed. Finally the questionnaire design is described and the research plan is depicted which is followed by the chapter conclusion.

### 4.1 Research Framework

Saunders et al. (2012) portray the research framework using an analogy of an 'onion'. In this 'onion' analogy each layer of the research framework is analysed from the outside in, to identify the best methodology to select for the research study before the data collection and analysis stage takes place. This framework provides an effective tool that guides the progression of the research study in an organised and structured way.

*'This overarching term relates to the development of knowledge and the nature of that knowledge' (Saunders et al. 2012, p.127).*

The researcher will make assumptions throughout the research in relation to the nature of reality, human knowledge, and the interpretation of the research question, methods used to conduct

research and what understandings are taken from the findings. The researcher's assumptions will necessarily influence the choice of research strategy and methods employed in the research study.

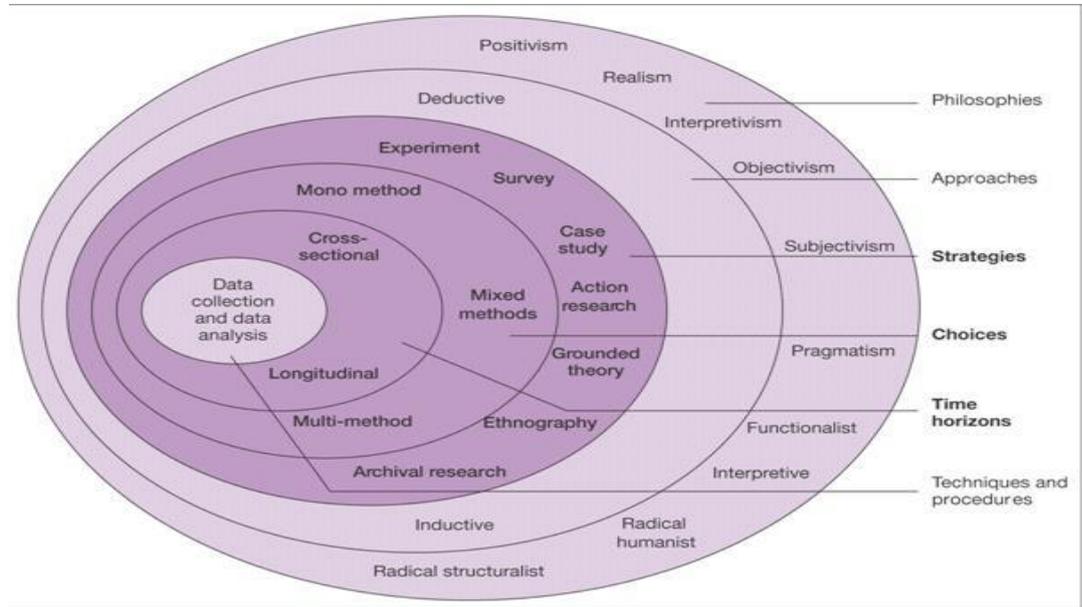


Figure 3: Saunders, Lewis and Thornhill 'Research onion' (2012, p.128)

Quinlan (2011) identifies two main categories of research philosophy as ontology and epistemology. Questions related to the nature of reality are ontological questions. Questions related to methodologies used in the research project relate to how the researcher understands knowledge, its creation, how to value it and its validity; these are epistemological questions.

Saunders et al. (2012) state that epistemology concerns what constitutes acceptable knowledge in a field of study. There are two major perspectives positivism and interpretivism.

The philosophy of positivism is adopted from natural science. It is concerned with observability and predictability, such as cause and effect that can be used to create law like generalisations – the stance of the natural scientist (Saunders et al. 2012). Data is collected relating to existing theories, and hypotheses proposed and tested; data gathering

is structured, measurable, involves large samples of quantitative data which can be statistically tested; it is generally not influenced by the researchers values. Positivism is related to quantitative data collection methodologies including questionnaires and experiments (Saunders et al. 2012).

Interpretivism, conversely, takes a differing approach believing that the world cannot be understood through the application of the research method of natural science. Interpretivists are critical of positivism and argue that statistical patterns cannot reflect the complexities of the world and simplify them down to a set of generalisations. Interpretivism is associated with unstructured qualitative data gathering methods (Saunders et al., 2012).

#### 4.1.1 Deductive versus Inductive research approach

A deductive approach is founded on a field of knowledge and theories as related to a particular field. Hypotheses are deduced from these theories, observations made and the hypotheses are either confirmed or rejected. Deductive analysis is the analysis of data in order to test prior assumptions, theories and hypotheses identified by the researcher (Bryman and Bell, 2015). Saunders et al. (2012) identify five stages in the deductive approach: formulating a hypothesis, deduce a testable proposition based on the existing literature, compare the hypothesis to existing literature, testing the hypothesis and observing the outcome. If consistent with the theory then it is corroborated, if not then adapting the hypothesis in light of the result and retesting.

Inductive research involves the development of a theory through the examination of reality and involves the extension from the specific to the general. Data is collected to explore a phenomenon, to facilitate the identification of patterns and trends in order to create a conceptual framework (Saunders et al., 2012).

#### 4.1.2 Research Strategies

Bryman and Bell, (2015) identify quantitative research as a research strategy that emphasises quantification in the collection and analysis of data, entails a deductive approach between the theory and the research that emphasises testing the theories; employs a natural scientific model and is associated with positivism in particular, where numbered data can be analysed using statistical procedures.

Qualitative research is a research strategy that emphasises words over quantification in the collection and analysis of data, based on an interpretive philosophy, can use both deductive and inductive approaches, does not favour a natural scientific model but prefers an emphasis on ways that participants interpret their social world and views social reality as a constantly shifting property created by individuals (Bryman and Bell, 2015).

#### 4.1.3 Time horizons cross-section versus longitudinal

A cross-sectional study examines a particular phenomenon at a particular time, is conducted when time constraints exist and or there are limits on resources, the data is collected at one time (Saunders et al. 2012). Longitudinal studies are conducted over long periods of time, data is collected at different points in time (Saunders et al., 2012).

Through an examination of the various types of research the researcher can gain a better understanding of the research and identify the best approach in its performance.

## **4.2 Research Approaches Applied in Mobile Banking Adoption**

According to Shaikh & Karjaluoto (2014), two research approaches have been used in previous studies of mobile banking adoption: positivist and interpretive. These studies have relied on different methods of data collection including surveys, interviews and triangulation. Of the 55 studies reviewed by Shaikh & Karjaluoto (2014), quantitative research was the dominant method used in 82% of the studies while only 5% (3 studies) used qualitative methods such as interviews and 8% (5 studies) used both methods.

## **4.3 Research Design in this Study**

The research philosophy and approach chosen will influence the researcher's selection of research methodology, strategy and time horizon; these bring into focus the process of the research design and facilitate the development of the research questions into a research project. Design is concerned with the overall plan for the research study while tactics relate to how the data will be gathered and analysed (Saunders et al. 2012).

Based on Shaikh & Karjaluoto (2014), findings the majority of the research literature on mobile banking adoption is underpinned by a positivist philosophy. The researcher will conduct quantitative research to test hypotheses related to the conceptual framework, and hypothesized relationships previously established in TAM, IDT and the mobile banking adoption literature. The researcher believes that this research strategy, based on a deductive orientation, to be the most appropriate research methodology to test the relationships between variables. Bryman and Bell, (2015) identify quantitative research as a research strategy that emphasises quantification in the collection and analysis of data, entails a deductive approach that emphasises testing

the theories; employs a natural scientific model and is associated with positivism in particular.

The researcher's choice of research strategy is influenced by the previous choices made in relation to the research question formulated and the link to the research philosophy, approach and methodology chosen. The researcher has chosen to follow a quantitative methodology which is principally linked to two research strategies experiment and survey (Saunders et al. 2012).

Quinlan, (2011) states that surveys tend to be used in quantitative or largely quantitative research projects. The methods of data collection tend to be questionnaires and scales, samples tend to be large and that questionnaires or scales are an effective means of researching large populations.

Surveys that use questionnaires enable the collection of data in standardised form from large populations in an economical way, facilitate comparison and are easily understood and explained. Quantitative data can be gathered and analysed to discover relationships between variables and model these relationships; sampling can be used to generate representative findings of a population without having to survey the whole population. However by its nature the data collected in a survey will be narrower than that collected in other research strategies due to the limit on the number of questions in a questionnaire that a respondent will be willing to answer (Saunders et al. 2012).

The researcher proposes that a questionnaire is the most appropriate instrument for data collection in the proposed study. A questionnaire will facilitate the gathering of information on the attributes of mobile banking adoption and how these influenced the behavioural intentions of consumer's to adopt or reject mobile banking and the relative influence of the reasons for and against adoption. Additionally they are useful in

gathering small sets of data from a wide audience online through the internet. Online surveys are a common and effective technique to survey the population who have the access and skills necessary to use the technology (Quinlan, 2011). The researcher has identified, based on review of the literature and the hypotheses being tested, the most up to date, reliable and valid scales.

The choice of a survey strategy was influenced by the literature review, where similar studies on TAM and IDT were conducted which indicated that 82% of studies employed this technique (Shaikh & Karjaluoto, 2014).

#### 4.3.1 Population and sample size

Saunders et al. (2012), identifies probability and non-probability as two styles of sampling techniques and argues that non-probability sampling is often used when there are time and cost constraints. The target population for the proposed study are all adults living in Ireland that have bank accounts and have used mobile banking applications to access their account or transact on their account or both. The size of the entire target population is difficult to measure or know, therefore sampling was used for data collection.

Convenience and snowball sampling were used in this research. A convenience sample technique is proposed which reflects easy and feasible access. Convenience sampling techniques are used for those participants who are easy to include in the research sample (Quinlan, 2011). Additionally snowball sampling will be adopted which is often used where targeted respondents are not registered as a population (Saunders et al. 2012). Snowball sampling occurs where the researcher identifies a small number of respondents that identify additional respondents in the population and this method is often used when difficulties exist in the identification of the target populations members (Saunders et al. 2012).

The larger a sample size, the lower the probability of error when generalising for a population. Probability sampling entails a compromise between the amount of data required to be gathered and analysed and the accuracy required of a study. Statistics can be used to calculate the required sample size of a population that provides the required confidence level and an acceptable margin of error for the research study. For a population of one million to ten million, 384 samples can provide a 95 confidence level with a 5% margin of error. For the same population, 1067 samples can provide a 95 confidence level with a 3% margin of error (Saunders et al., 2012).

Population	Margin of error			
	5%	3%	2%	1%
50	44	48	49	50
100	79	91	96	99
150	108	132	141	148
200	132	168	185	196
250	151	203	226	244
300	168	234	267	291
400	196	291	343	384
500	217	340	414	475
750	254	440	571	696
1 000	278	516	706	906
2 000	322	696	1091	1655
5 000	357	879	1622	3288
10 000	370	964	1936	4899
100 000	383	1056	2345	8762
1 000 000	384	1066	2395	9513
10 000 000	384	1067	2400	9595

**Table 3: Sample sizes for different sizes of population at a 95 confidence level, (Saunders et al., 2009)**

In total there were 244 responses to the survey however there were only 233 valid responses. The difference of 11 was due to respondents not completing the survey.

## **4.4 Data Collection**

A self-administrated questionnaire is used to gather the data for this study. Email invitations are used as they represent an inexpensive, efficient and convenient method for respondents to consider the questions and answers. Online surveys are a common and effective technique to survey the population who have access and skills necessary to use the technology (Quinlan, 2011). The email state the reasons for online survey and requests the recipient's participation. Emails were sent to industry contacts in both public, private and education sectors and respondents could access the questionnaire through an embedded link to survey monkey. The questionnaire is designed to take approximately five minutes to complete.

## **4.5 Questionnaire design**

A questionnaire was designed and a covering email invitation created as the instrument used for data collection. The covering email and survey instrument are shown in Appendix A and B respectively. The email explained the rationale for the study and included the researchers contact information. The survey was subdivided into three parts:

- Demographic characteristics covering age, gender, education level and mobile banking experience
- Conceptual framework constructs including perceived usefulness, perceived ease of use, compatibility, perceived risk, perceived trust and self-efficacy
- Behavioural intention construct

According to Quinlan (2011), the Likert scale is widely used for the measurement of attitudes as it measures both direction and force. Likert scales can contain three-point, five-point or seven point scales measuring attitude or behavioural statements. To respond to a Likert

scale the respondent simply reads the statement and places a tick in a box that corresponds to their attitude to that statement (Quinlan, 2011). This survey used a 1 to 7 Likert scale to examine respondent's behaviour related to the conceptual framework constructs where 1 signified "strongly disagree" and 7 signified "strongly agree". Closed questions on demographics were included to identify if there are common threads.

#### **4.6 Ethical Considerations**

Quinlan, (2011) argues that a researcher must reflect on their code of contact when engaging with participants, their methods of data collection and storage, how it is analysed and how they write it up. Ethics are part of every aspect of the research process. Further the two most important principals of confidentiality and anonymity will be adhered to. Ethical issues were discussed with the supervisor. The cover email and survey instrument have been included in Appendix A and B respectively. The email included researchers contact details and emphasised that participation is strictly voluntary. Participants were notified of the confidentiality of their responses, their anonymity, the nature and purpose of the research and what is required from them as a participant.

#### **4.7 Data analysis validity and reliability**

The data collected was inputted into an SPSS (Statistical Packages for Social Sciences) tool for analysis. This is a tool that enables the analysis of large data sets developed through surveys (Quinlan, 2011). Based on the literature review the items identified to be measured are the independent variables (perceived usefulness, perceived ease of use, compatibility, perceived risk, perceived trust, perceived, self-efficacy and behavioural intention), will be subjected to multiple regression analysis, as in similar studies (Al-Jabri and Sohil, 2012;

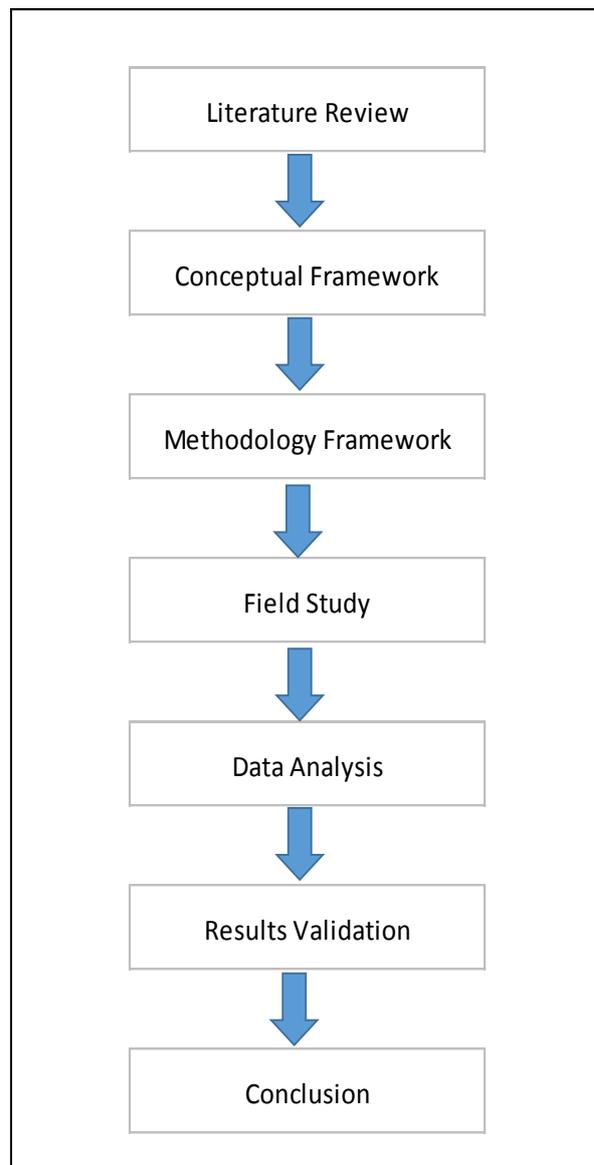
Agarwal and Prasad, 1998; Dash and Bhusan, 2014; Claudy et al, 2015; Lee, Hsieh & Hsu, 2011). The dependant variable is behavioural intention towards mobile banking.

Cronbach's Alpha is one of the most commonly used indicators of internal consistency (Saunders et al. 2012) and was used to measure internal consistency of the scales. Values over .8 are normally regarded as indicating the reliability of a scale. The scales used in this study have been adapted from scales used and tested by other researchers. Results of these reliability tests are set out in Table 7. Results indicate that all scales are reliable.

<b>Scale</b>	<b>Cronbach's Alpha</b>
Perceived usefulness	.938
Perceived ease of use	.918
Compatibility	.840
Perceived risk	.979
Perceived trust	.936
Self-efficacy	.917
Behavioural intention	.958

**Table 4: Cronbach' Alpha Reliability of Scales**

## 4.8 Research Design



*Figure 4: Research Design*

## 4.9 Limitations of the research design

No qualitative research was carried out. The researcher would have liked to have undertaken qualitative interviews after the survey which may have led to a deeper understanding of the factors influencing mobile banking adoption in Ireland. The survey by its nature contains closed-ended questions allowing the researcher to collect quantitative data. The researcher would then conduct an interview using open-

ended questions to collect the narrative data. Due to time constraints it was not possible for the researcher to adopt this mixed method approach. The researcher therefore believes there is further scope for research to be carried out on this topic.

#### **4.10 Chapter Conclusion**

This chapter discussed the differing research philosophies and research methods available to a researcher. These included positivist and interpretivist paradigms, deductive and inductive research approaches and quantitative and qualitative data gathering methods. By examining the available research methods the researcher identified the appropriate method to utilise in this research study, facilitating the research design, choice of sample method and size, survey design and data required to be analysed.

The next chapter concentrates on the questionnaire results, the sample composition, mobile banking adoption, and the effects of demographic characteristics on the conceptual framework factors and behavioural intention.

# Chapter Five: Data Analysis

## 5.1 Introduction

This chapter presents the results of the research. The results are broken down across seven categories:

- Perceived usefulness of mobile banking
- Perceived ease of use of mobile banking
- Compatibility of mobile banking with lifestyle
- Perceived risk of mobile banking
- Perceived trust of mobile banking
- Self-efficacy in the use of mobile banking
- Behavioural intention towards mobile banking

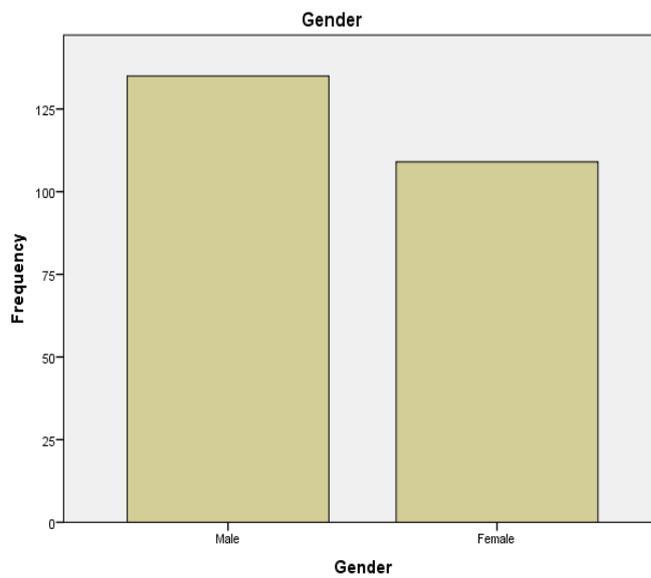
Under each category the characteristics of each variable are presented along with the results of the statistical tests carried out. First the sample is profiled across the demographic variables collected gender, age and level of education. Secondly the reliability of the scales used to measure the above seven factors are examined using Cronbach's Alpha test for reliability. Third the effect of demographics on behavioural intention in Ireland is examined. Fourth the sample is split in two randomly selected groupings and the first grouping used to a to develop the proposed conceptual model investigating the association between the single dependent variable behavioural intention (BI) and independent variables perceived usefulness (PU), perceived ease of use (PEOU), compatibility (COM), perceived risk (PR), perceived trust (PTRU) and self-efficacy (SE). The second randomly selected group of 120 respondents is then used to test the predictive validity of the conceptual model through comparison of predicted levels of behavioural intention and actual behavioural intention of the sample respondents collected. Finally the results of the multiple linear regression analysis is used to determine if the hypotheses under examination are supported or not by the evidence gathered.

## 5.2 Sample Composition

Tables 8, 9 and 10 show the demographic characteristics of gender, age and education level across the sample that consists of 244 valid respondents in Ireland. Table 8 indicates that 55.3% (135) of the participants are men and 44.7% (109) are women. Figure 5 displays the gender frequencies graphically.

		Gender			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	135	55.3	55.3	55.3
	Female	109	44.7	44.7	100.0
Total		244	100.0	100.0	

**Table 5: Gender Sample Size**

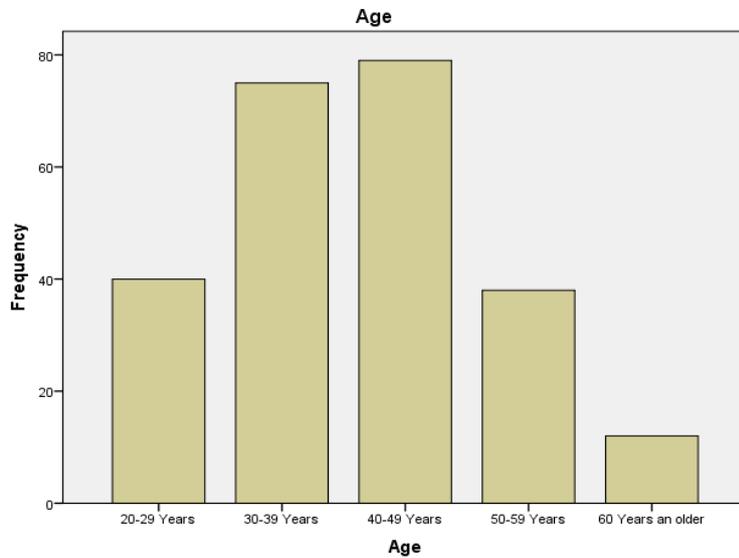


**Figure 5: Gender Sample Size**

		Age			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20-29 Years	40	16.4	16.4	16.4
	30-39 Years	75	30.7	30.7	47.1
	40-49 Years	79	32.4	32.4	79.5
	50-59 Years	38	15.6	15.6	95.1
	60 Years an older	12	4.9	4.9	100.0
Total		244	100.0	100.0	

**Table 6: Age Group Sample Sizes**

Table 9 illustrates that the majority of respondents (79 or 32.4%) are aged between 40-49; 75 (30.7%) are between 30-39 years; 40 (16.4%) are in age range 20-29, and 15.6% and 4.9% are included in 50-59 years, and 60 years and older respectively. Figure 6 illustrates this graphically.



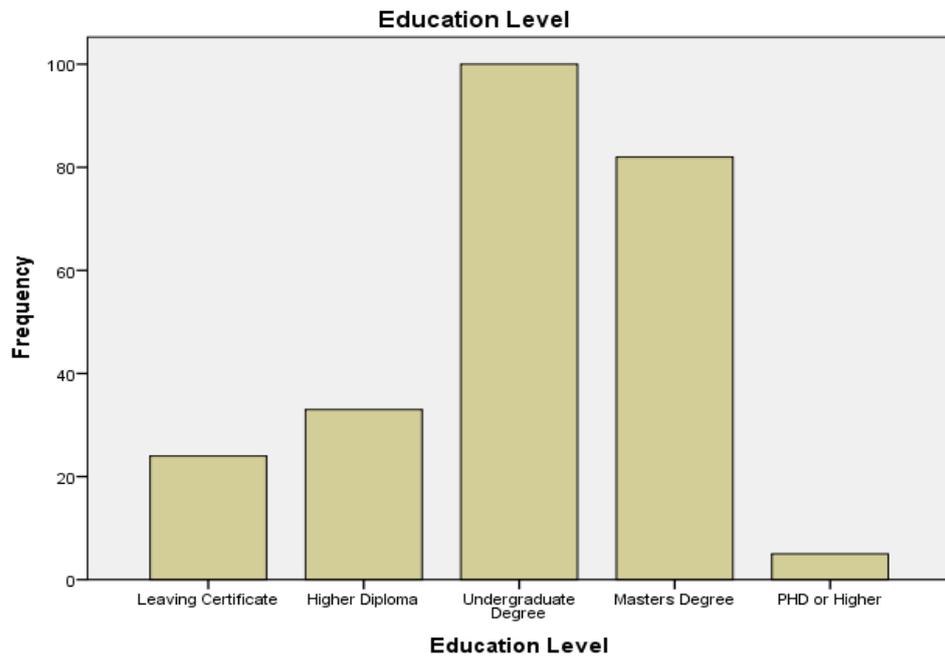
**Figure 6: Age Group Sample Sizes**

**Education Level**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Leaving Certificate	24	9.8	9.8	9.8
Higher Diploma	33	13.5	13.5	23.4
Undergraduate Degree	100	41.0	41.0	64.3
Masters Degree	82	33.6	33.6	98.0
PHD or Higher	5	2.0	2.0	100.0
Total	244	100.0	100.0	

**Table 7: Education Level Sample Sizes**

Table 10 shows that most of respondents 41.0% hold an Undergraduate degree; 33.6% hold a Master’s degree; 2.0% attained PhD or higher, and 13.5% and 9.8% hold Higher Diploma’s and Leaving Certificate’s respectively. Figure 7 portrays the sample education level frequencies graphically.



**Figure 7: Education Level Sample Sizes**

The next section examines the results of statistical analysis.

## 5.3 Results

### 5.3.1 Scale Reliability Results

This section presents the results from tests of reliability for each of the Likert scales considered in this study including:

- Perceived usefulness
- Perceived ease of use
- Compatibility
- Perceived risk
- Perceived trust
- Perceived self-efficacy
- Behavioural intention

Cronbach's alpha is commonly used to measure the internal consistency of a scale, (a measure of reliability). It enables a researcher to ensure that the items included in the scale are measuring the same underlying construct. It is applied most commonly to Likert questions in surveys where the researcher wants to determine if the scale is reliable (Laerd Statistics, 2015c).

#### 5.3.1.1 Perceived Usefulness Scale Reliability Results

Table 11 and 12 below illustrate the results of a reliability analysis for the perceived usefulness scale. A questionnaire was employed to measure different, underlying constructs. One construct, 'Perceived Usefulness', consisted of four questions to which there were 240 valid responses. The scale had a high level of internal consistency, as determined by a Cronbach's alpha value of 0.938.

		N	%
Cases	Valid	240	98.4
	Excluded <sup>a</sup>	4	1.6
	Total	244	100.0

a. Listwise deletion based on all variables in the procedure.

**Table 8: Perceived Usefulness Scale Case Summary**

Cronbach's Alpha	N of Items
.938	4

**Table 9: Perceived Usefulness Reliability Results**

### 5.3.1.2 Perceived Ease of Use Scale Reliability Results

Table 13 and 14 below show the results of a reliability analysis for the perceived ease of use scale. A survey was employed to measure different constructs. There were 239 valid responses to the 4 questions measuring the construct 'Perceived Ease of Use'. The scale had a high level of internal consistency, as determined by a Cronbach's alpha value of .918.

		N	%
Cases	Valid	239	98.0
	Excluded <sup>a</sup>	5	2.0
	Total	244	100.0

a. Listwise deletion based on all variables in the procedure.

**Table 10: Perceived Ease of Use Scale Case Summary**

Cronbach's Alpha	N of Items
.918	4

**Table 11: Perceived Ease of Use Scale Reliability Results**

### 5.3.1.3 Compatibility Scale Reliability Results

Table 15 and 16 below illustrate the results of a reliability analysis for the compatibility scale. A survey instrument was used to measure different underlying constructs. One such construct was 'Compatibility', there were 237 valid responses to these 5 survey items that combined to form the overall composite score for the scale. A Cronbach's alpha value of .840 is reported indicating a high level of internal consistency.

**Case Processing Summary**

		N	%
Cases	Valid	237	97.1
	Excluded <sup>a</sup>	7	2.9
	Total	244	100.0

a. Listwise deletion based on all variables in the procedure.

**Table 12: Compatibility Scale Case Summary**

**Reliability Statistics**

Cronbach's Alpha	N of Items
.840	5

**Table 13: Compatibility Scale Reliability Results**

### 5.3.1.4 Perceived Risk Scale Reliability Results

Table 17 and 18 below depicts the results of a reliability analysis for the perceived risk scale. A questionnaire employed in the research measured different underlying constructs. 'Perceived Risk' was one of these constructs. There were 235 valid responses across 4 survey items. The scale had a high level of internal consistency, as determined by a Cronbach's alpha value of .979.

**Case Processing Summary**

		N	%
Cases	Valid	235	96.3
	Excluded <sup>a</sup>	9	3.7
	Total	244	100.0

a. Listwise deletion based on all variables in the procedure.

**Table 14: Perceived Risk Scale Case Summary**

**Reliability Statistics**

Cronbach's Alpha	N of Items
.979	4

**Table 15: Perceived Risk Scale Reliability Results**

### 5.3.1.5 Perceived Trust Scale Reliability Results

Table 19 and 20 below show the results of a reliability analysis for the perceived trust scale. Different underlying constructs were measured using a survey instrument. One of the constructs measured was 'Perceived Trust' which consisted of 4 survey items to which there were

234 valid responses. A Cronbach's alpha value of .936 is reported indicating a high level of internal consistency.

		N	%
Cases	Valid	234	95.9
	Excluded <sup>a</sup>	10	4.1
	Total	244	100.0

a. Listwise deletion based on all variables in the procedure.

**Table 16: Perceived Trust Scale Case Summary**

Cronbach's Alpha	N of Items
.936	4

**Table 17: Perceived Trust Scale Reliability Results**

### 5.3.1.6 Perceived Self-efficacy Scale Reliability Results

Table 21 and 22 below illustrate the results of a reliability analysis for the self-efficacy scale. A survey instrument was used to measure different underlying constructs. One such construct was 'Self-efficacy' consisted of 4 questions to which there were 234 valid responses. As determined by a Cronbach's alpha value of .917 the scale had a high level of internal consistency.

		N	%
Cases	Valid	234	95.9
	Excluded <sup>a</sup>	10	4.1
	Total	244	100.0

a. Listwise deletion based on all variables in the procedure.

**Table 18: Self-efficacy Scale Case Summary**

Cronbach's Alpha	N of Items
.917	4

**Table 19: Self-efficacy Scale Reliability Results**

### 5.3.1.7 Behavioural Intention Scale Reliability Results

Table 23 and 24 below illustrate the results of a reliability test for the behavioural intention scale. A questionnaire was employed to measure different, underlying constructs. One construct, 'Behavioural Intention' consisted of 4 items. There were 233 valid responses across the 4 items. The scale had a high level of internal consistency, as determined by a Cronbach's alpha of .958.

		N	%
Cases	Valid	233	95.5
	Excluded <sup>a</sup>	11	4.5
	Total	244	100.0

a. Listwise deletion based on all variables in the procedure.

**Table 20: Behavioural Intention Scale Case Summary**

Cronbach's Alpha	N of Items
.958	4

**Table 21: Behavioural Intention Scale Reliability Results**

The next section examines the influence of demographics on behavioural intention.

### 5.3.2 Effect of Demographics on Behavioural Intention in Ireland

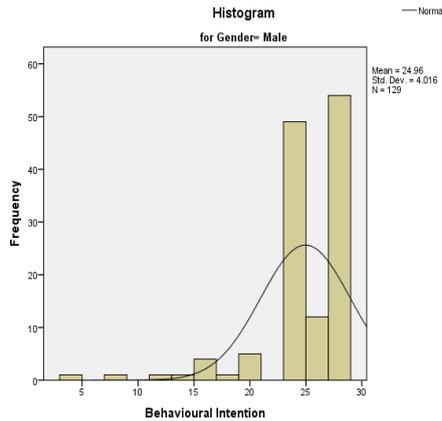
A secondary aim was to investigate if demographics influenced behavioural intention to participants towards mobile banking in Ireland. The demographic characteristics examined included gender, age and education level.

#### 5.3.2.1 Behavioural Intention and Gender

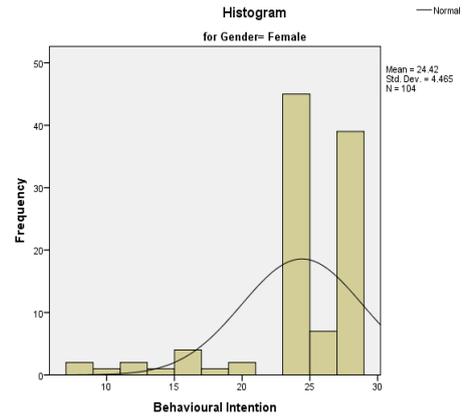
The study included 233 valid responses of whom 129 were male and 104 were female. The case summary is displayed in Table 25.

		Cases					
		Valid		Missing		Total	
		N	Percent	N	Percent	N	Percent
Behavioural Intention	Male	129	95.6%	6	4.4%	135	100.0%
	Female	104	95.4%	5	4.6%	109	100.0%

**Table 22: Gender Behavioural Intention Sample Sizes**



**Figure 8: Behavioural Intention Male Distribution**



**Figure 9: Behavioural Intention Female Distribution**

Histograms of the behavioural intention distribution levels of both male and female respondents are presented in Figure 8 and 9 respectively. The horizontal axis represents behavioural intention to use mobile banking, while the vertical axis indicates the number of respondents that answered the behavioural intention scale. On the horizontal axis, 28 indicates that respondents strongly agreed that they intend to adopt mobile banking, while 4 indicates they strongly disagreed that they intend to adopt mobile banking. All associated descriptive statistics related to male and female samples can be found in Table 1 of Appendix C.

Normality test results are presented in Table 26. The Shapiro-Wilk's test has been relied upon to test the hypothesis that the distribution is normal or that there is an absence of normality in both the male and female sample distributions. The null hypothesis associated with the test assumes the normality of the sample tested. If the assumption of normality has been violated, then the "Sig" value  $p < .05$  level, and if it is not violated if  $p > .05$ . Rejecting the null hypothesis means that the data's distribution is not equal to a normal distribution (Laerd Statistics, 2015f).

Behavioural Intention scores were not normally distributed for males or females, as assessed by Shapiro-Wilk's test ( $p < .001$ ). The results indicate a significant deviation from normality in both cases ( $W_{\text{MALE}} = .694$ ,  $df = 129$ ,  $p < .001$ ), ( $W_{\text{FEMALE}} = .707$ ,  $df = 104$ ,  $p < .001$ ).

**Tests of Normality**

		Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Behavioural Intention	Male	.297	129	.000	.694	129	.000
	Female	.337	104	.000	.707	104	.000

a. Lilliefors Significance Correction

**Table 23: Behavioural Intention Normality Results**

The existence of this difference in normality requires a Mann-Whitney U test to be run to test if there is a significant difference between the levels of behavioural intention between males and females. The Mann-Whitney U test is a rank-based nonparametric test that enables researchers to identify differences between two groups on a dependent variable (Laerd Statistics, 2015b). The results of the Mann-Whitney U test are depicted in Table 27 and 28. A Mann-Whitney U test was run to determine if there were differences in behavioural intention scores between males and females. Median behavioural intention scores for males (mean rank = 120.45) and females (mean rank = 112.72) were found not significantly statistically different,  $U = 6262.5$ ,  $z = -.934$ ,  $p = .350$ .

**Ranks**

		N	Mean Rank	Sum of Ranks
Behavioural Intention	Male	129	120.45	15538.50
	Female	104	112.72	11722.50
Total		233		

**Table 24: Behavioural Intention Mann-Whitney Test: Mean**

**Test Statistics<sup>a</sup>**

	Behavioural Intention
Mann-Whitney U	6262.500
Wilcoxon W	11722.500
Z	-.934
Asymp. Sig. (2-tailed)	.350

a. Grouping Variable: Gender

**Table 25: Behavioural Intention Grouping Variable: Gender**

The next section examines the results presented when differences in behavioural intention are analysed between age groups.

### 5.3.2.2 Behavioural Intention and Age

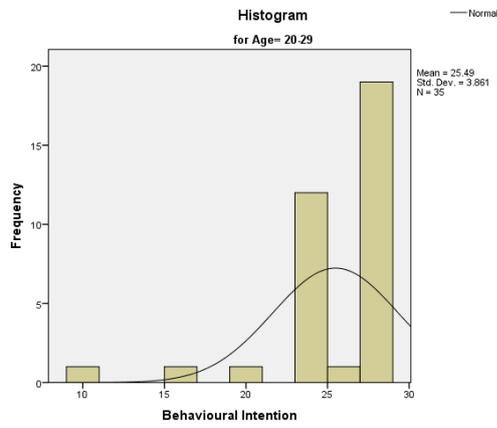
The case summary for behavioural intention and age categories is displayed in Table 29. The research included 233 valid responses of whom 35 were in the 20-29 age category, 73 in the 30-39 age category, 78 in the 40-49 age category, 36 in the 50-59 age category with 11 respondents in the 60 or older age category.

**Case Processing Summary**

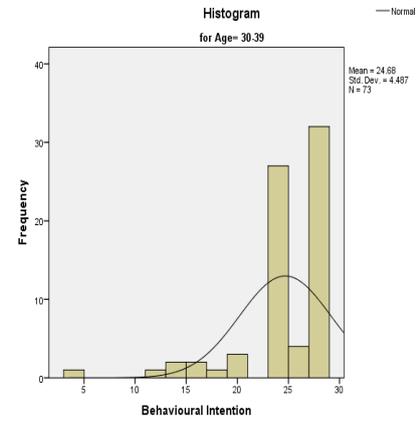
Age		Cases					
		Valid		Missing		Total	
		N	Percent	N	Percent	N	Percent
Behavioural Intention	20-29	35	87.5%	5	12.5%	40	100.0%
	30-39	73	97.3%	2	2.7%	75	100.0%
	40-49	78	98.7%	1	1.3%	79	100.0%
	50-59	36	94.7%	2	5.3%	38	100.0%
	60 or older	11	91.7%	1	8.3%	12	100.0%

**Table 26: Age Behavioural Intention Sample Sizes**

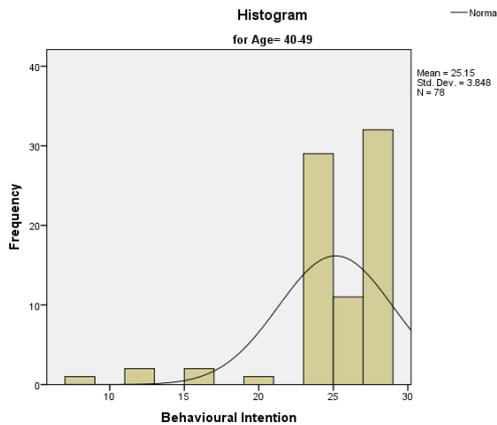
Figure 10 through figure 14 illustrate histograms of the behavioural intention distribution levels by age category. The horizontal axis represents behavioural intention towards adoption of mobile banking, while the vertical axis indicates the number of respondents that answered the behavioural intention scale. On the horizontal access, 28 indicates participants strongly agreed that they would adopt mobile banking, while 4 indicates they strongly disagreed that they intend to adopt mobile banking. All associated descriptive statistics related to age sample distributions can be found in Table 2 that can be found in Appendix C.



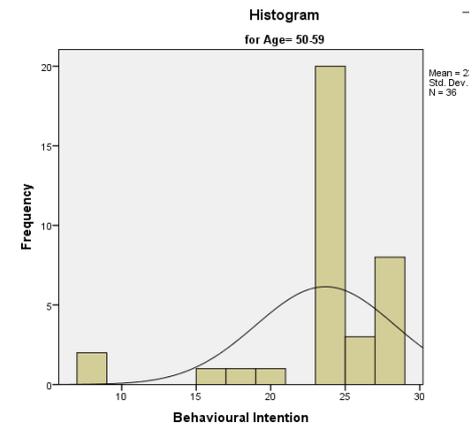
**Figure 10: Behavioural Intention Age Distributions 20-29 Years**



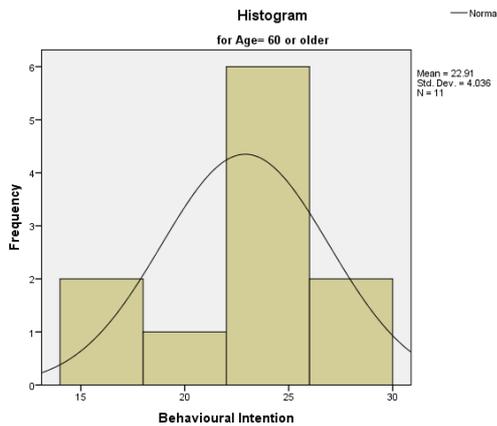
**Figure 11: Behavioural Intention Age Distributions 30-39 Years**



**Figure 12: Behavioural Intention Age Distributions 40-49 Years**



**Figure 13: Behavioural Intention Age Distributions 50-59 Years**



**Figure 14: Behavioural Intention Age Distributions 60 and Older**

Normality test results are presented in Table 30. The Shapiro-Wilk's test has been relied upon to test the hypothesis that the distribution is normal or that there is an absence of normality in all age category distributions. The null hypothesis associated with the test assumes that

normality of the sample tested. Behavioural Intention scores were not normally distributed for all age groups as assessed by Shapiro-Wilk's test ( $p < .05$ ). The results indicate a statistically significant deviation from normality in all age categories, ( $W_{20-29\text{years}} = .653$ ,  $df = 35$ ,  $p < .001$ ,  $W_{30-39\text{years}} = .706$ ,  $df = 73$ ,  $p < .001$ ,  $W_{40-49\text{years}} = .666$ ,  $df = 78$ ,  $p < .001$ ,  $W_{50-59\text{years}} = .674$ ,  $df = 36$ ,  $p < .001$ ,  $W_{60\text{years}} = .826$ ,  $df = 11$ ,  $p = .021$ ).

Tests of Normality							
Age		Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Behavioural Intention	20-29	.285	35	.000	.653	35	.000
	30-39	.302	73	.000	.706	73	.000
	40-49	.305	78	.000	.666	78	.000
	50-59	.390	36	.000	.674	36	.000
	60 or older	.334	11	.001	.826	11	.021

a. Lilliefors Significance Correction

**Table 27: Behavioural intention Normality Results**

The existence of significant deviations from normality requires a Kruskal-Wallis H test to be run to test if there is a significant differences between the levels of the behavioural intention examined between age groups.

The Kruskal-Wallis H test is a rank-based nonparametric test that is used to examine if a statistically significant difference exists between a dependent variable and two or more groups of an independent variable (Laerd Statistics, 2015a).

The results of the Kruskal-Wallis H Test are depicted in Table 31, Table 32, Table 33 and Figures 15.

**Hypothesis Test Summary**

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of Behavioural Intention is the same across categories of Age.	Independent-Samples Kruskal-Wallis Test	.026	Reject the null hypothesis.

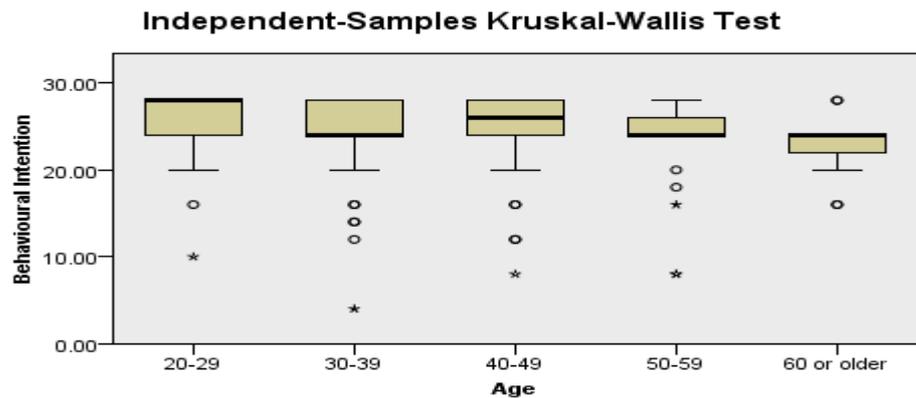
Asymptotic significances are displayed. The significance level is .05.

**Table 28: Hypothesis Test Summary**

**Ranks**

	Age	N	Mean Rank
Behavioural Intention	20-29	35	132.04
	30-39	73	118.73
	40-49	78	123.79
	50-59	36	95.64
	60 or older	11	79.45
	Total	233	

**Table 29: Age Group Kruskal-Wallis Test: Mean**



<b>Total N</b>	233
<b>Test Statistic</b>	11.045
<b>Degrees of Freedom</b>	4
<b>Asymptotic Sig. (2-sided test)</b>	.026

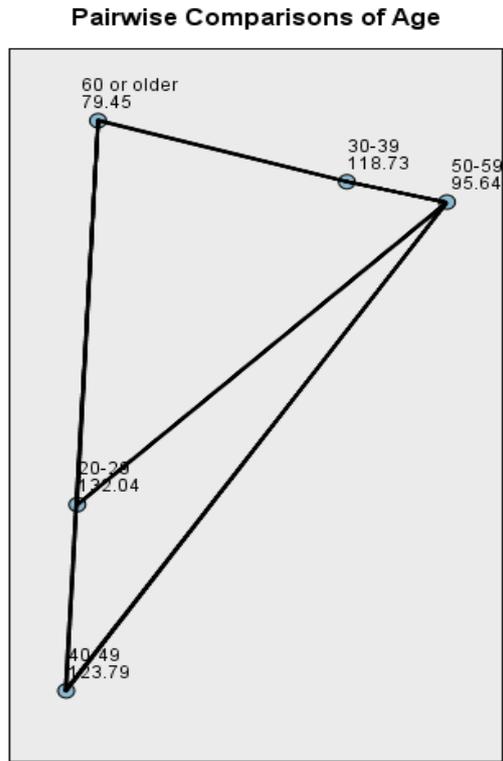
1. The test statistic is adjusted for ties.

**Figure 15: Behavioural Intention Distribution Scores by Age Group**

A Kruskal-Wallis H test was conducted to determine if there were differences in behavioural intention scores between groups in the age categories: 20-29 years (n = 35), 30-39 years (n = 73), 40-49 years (n = 78), 50-59 years (n = 36) and 60 or older (n = 11) age groups. Values are mean ranks unless otherwise stated.

Distributions of behavioural intention scores were not similar for all groups, as assessed by visual inspection of a boxplot. The distributions of behavioural intention score were statistically significantly different between groups,  $\chi^2(4) = 11.045$ ,  $p = .026$ . Pairwise comparisons were performed using Dunn's (1964) procedure with a Bonferroni correction for multiple comparisons. Statistical significance was accepted at the  $p < .001$  level. This post hoc analysis revealed no statistically significant differences in behavioural intention scores between revealed no

statistically significant differences in behavioural intention between the any of the age groupings.



Each node shows the sample average rank of Age.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
60 or older-50-59	16.184	21.662	.747	.455	1.000
60 or older-30-39	39.271	20.336	1.931	.053	.535
60 or older-40-49	44.334	20.251	2.189	.029	.286
60 or older-20-29	52.588	21.734	2.420	.016	.155
50-59-30-39	23.087	12.805	1.803	.071	.714
50-59-40-49	28.150	12.669	2.222	.026	.263
50-59-20-29	36.404	14.926	2.439	.015	.147
30-39-40-49	-5.062	10.239	-.494	.621	1.000
30-39-20-29	13.317	12.927	1.030	.303	1.000
40-49-20-29	8.254	12.792	.645	.519	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same. Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

**Table 30: Pairwise Comparisons of Age**

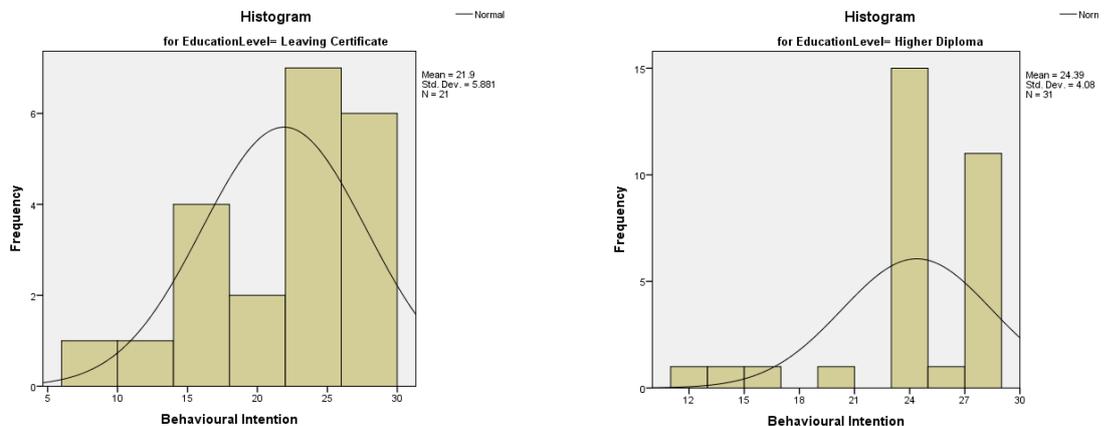
### 5.3.2.3 Behavioural Intention and Education

The study included 233 valid responses of which 21 make up the Leaving Certificate category, 31 in the Higher Diploma category, 96 in the Undergraduate Degree category, and 80 in the Master's Degree category with 5 in the PHD or higher category. The case summary is displayed in Table 34.

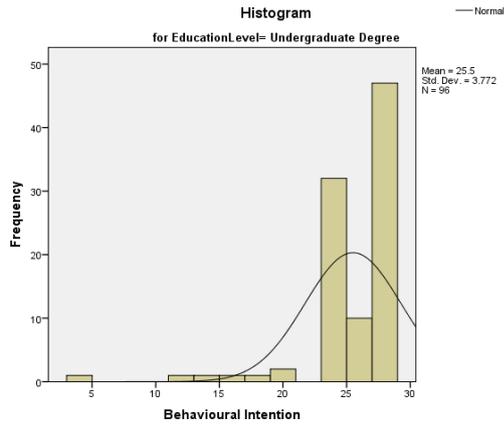
Education Level		Cases					
		Valid		Missing		Total	
		N	Percent	N	Percent	N	Percent
Behavioural Intention	Leaving Certificate	21	87.5%	3	12.5%	24	100.0%
	Higher Diploma	31	93.9%	2	6.1%	33	100.0%
	Undergraduate Degree	96	96.0%	4	4.0%	100	100.0%
	Masters Degree	80	97.6%	2	2.4%	82	100.0%
	PHD or higher	5	100.0%	0	0.0%	5	100.0%

**Table 31: Education Behavioural Intention Sample Sizes**

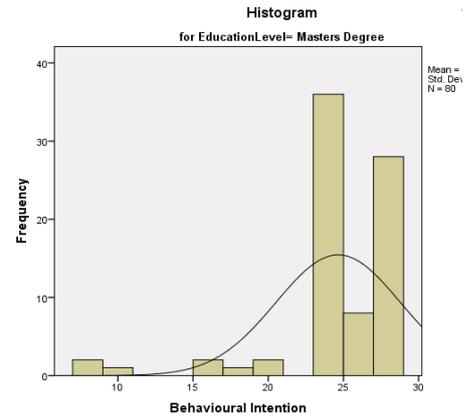
Figure 16 through figure 20 illustrate histograms of the behavioural intention distribution levels by education level groupings. The horizontal axis represents behavioural intention towards mobile banking adoption, while the vertical axis indicates the number of respondents that answered the behavioural intention scale. On the horizontal access, 28 indicates participants strongly agreed that they intend to use mobile banking, while 4 indicates they strongly disagree they intend to use mobile banking. All associated descriptive statistics related to education level sample distributions can be found in Table 3 in Appendix C.



**Figure 16: Behavioural Intention Leaving Certificate**

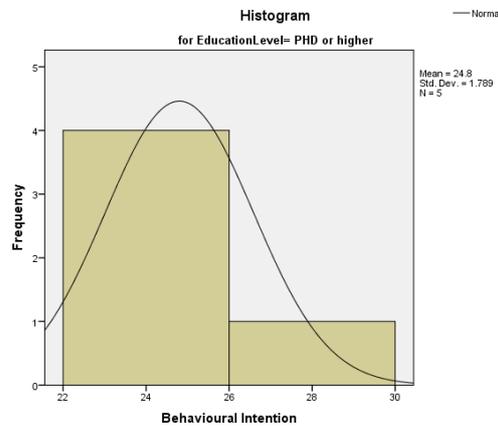


**Figure 17: Behavioural Intention Higher Diploma**



**Figure 18: Behavioural Intention Undergraduate**

**Figure 19: Behavioural Intention Master's Degree**



**Figure 20: Behavioural Intention PHD or Higher**

Results of the Shapiro-Wilk's test for normality are presented in Table 35. The Shapiro-Wilk test has been relied upon to test the hypothesis that the distribution is normal or that there is an absence of normality in each age categories sample distributions. The null hypothesis associated with the test assumes that normality of the sample tested. Behavioural Intention scores were found not normally distributed for all education level groupings, as assessed by Shapiro-Wilk's test ( $p < .05$ ). The results indicate a significant deviation from normality in all education level groupings ( $W_{\text{Leaving Certificate}} = .869$ ,  $df = 21$ ,  $p = .009$ ,  $W_{\text{Higher Diploma}} = .739$ ,  $df = 31$ ,  $p < .001$ ,  $W_{\text{Undergraduate Degree}} = .635$ ,  $df = 96$ ,  $p < .001$ ,  $W_{\text{Master's Degrees}} = .676$ ,  $df = 80$ ,  $p < .001$ ,  $W_{\text{PHD or higher}} = .552$ ,  $df = 5$ ,  $p < .001$ ).

**Tests of Normality**

Education Level		Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Behavioural Intention	Leaving Certificate	.258	21	.001	.869	21	.009
	Higher Diploma	.333	31	.000	.739	31	.000
	Undergraduate Degree	.273	96	.000	.635	96	.000
	Masters Degree	.338	80	.000	.676	80	.000
	PHD or higher	.473	5	.001	.552	5	.000

a. Lilliefors Significance Correction

**Table 32: Behavioural intention Normality Results**

The existence of this difference in normality requires a Kruskal-Wallis H test to be run to test if there is a statistically significant difference between the levels of behavioural intention between education level groupings. The Kruskal-Wallis H test, tests for differences in mean ranks of more than two groups to identify if they are significantly different.

The results of the Kruskal-Wallis H Test are depicted in Table 36, Table 37, Table 38 and Figures 21.

**Hypothesis Test Summary**

	Null Hypothesis	Test	Sig.	Decision
<b>1</b>	The distribution of Behavioural Intention is the same across categories of Education Level.	Independent-Samples Kruskal-Wallis Test	.017	Reject the null hypothesis.

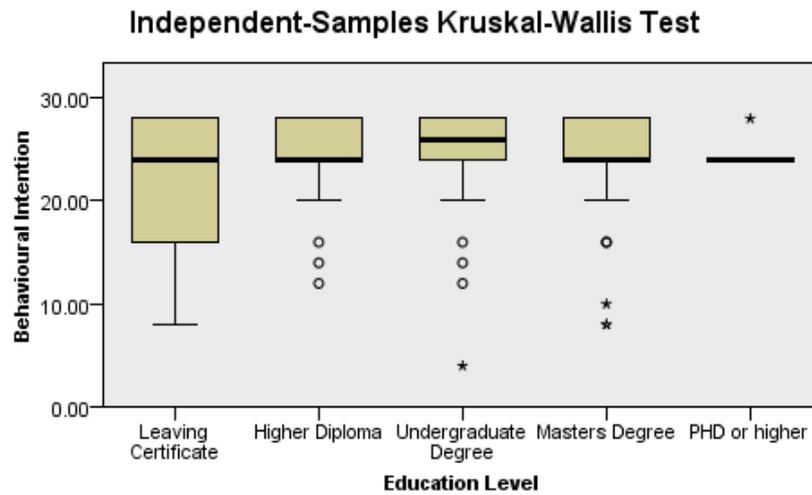
Asymptotic significances are displayed. The significance level is .05.

**Table 33: Hypothesis Test Summary**

**Ranks**

	Education Level	N	Mean Rank
Behavioural Intention	Leaving Certificate	21	83.79
	Higher Diploma	31	108.40
	Undergraduate Degree	96	131.07
	Masters Degree	80	113.42
	PHD or higher	5	97.00
	Total	233	

**Table 34: Education Level Group Kruskal-Wallis Test: Mean**

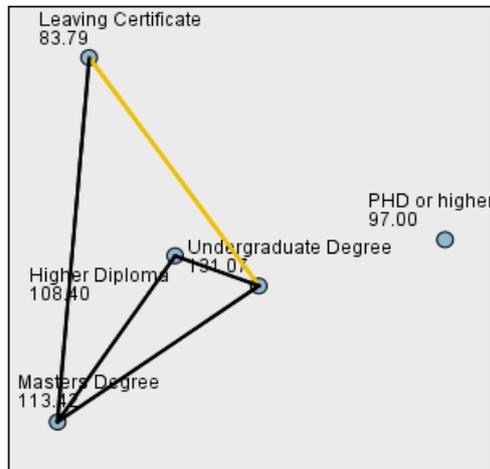


<b>Total N</b>	233
<b>Test Statistic</b>	12.010
<b>Degrees of Freedom</b>	4
<b>Asymptotic Sig. (2-sided test)</b>	.017

1. The test statistic is adjusted for ties.

**Figure 21: Behavioural Intention Distribution Scores by Education Level Group**

### Pairwise Comparisons of Education Level



Each node shows the sample average rank of Education Level.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
Leaving Certificate-PHD or higher	-13.214	31.288	-.422	.673	1.000
Leaving Certificate-Higher Diploma	-24.618	17.771	-1.385	.166	1.000
Leaving Certificate-Masters Degree	-29.633	15.417	-1.922	.055	.546
Leaving Certificate-Undergraduate Degree	-47.282	15.147	-3.121	.002	.018
PHD or higher-Higher Diploma	11.403	30.302	.376	.707	1.000
PHD or higher-Masters Degree	16.419	28.985	.566	.571	1.000
PHD or higher-Undergraduate Degree	34.068	28.842	1.181	.238	1.000
Higher Diploma-Masters Degree	-5.016	13.302	-.377	.706	1.000
Higher Diploma-Undergraduate Degree	-22.664	12.989	-1.745	.081	.810
Masters Degree-Undergraduate Degree	17.649	9.518	1.854	.064	.637

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same. Asymptotic significances (2-sided tests) are displayed. The significance level is .05.

**Table 35: Pairwise Comparisons of Education Level Groups**

A Kruskal-Wallis H test was run to determine if there were differences in behavioural Intention score between five groups of participants in different age categories: “Leaving Certificate” (n = 21) , “Higher Diploma” (n = 31), “Undergraduate Degree” (n = 96), “Master’s Degree” (n = 80) and “PHD or higher” (n = 5) education level groups.

Distributions of behavioural intention scores were not similar for all groups, as assessed by visual inspection of a boxplot. The distributions of behavioural intention score were statistically significantly different between groups,  $\chi^2 (4) = 12.010$ ,  $p = .017$ . Pairwise comparisons were performed using Dunn's (1964) procedure with a Bonferroni correction for multiple comparisons. Statistical significance was accepted at the  $p < .001$  level. This post hoc analysis revealed statistically significant differences in behavioural intention scores exist between Leaving Certificate (mean rank = 83.79) and Undergraduate Degree (mean rank = 131.07) ( $p = .018$ ) but not between any other group combination.

Table 39 summarises the results of the examination of the effect of demographics on behavioural intention.

Variable	Does a difference exist	(p)	Category of divergence
Gender	No	.350	N/A
Age Group	No	.026	N/A
Education Level	Yes	.017	Leaving Certificate and Undergraduate Degree

**Table 36: Summary of Demographics Findings**

The next section examines the results for correlation analysis between the dependent variable and the six independent variables.

The next section examines the results for correlation analysis between the dependent variable and the six independent variables.

### 5.3.3 Model Results

#### 5.3.3.1 Results from Correlation Analysis

Scatterplots for each of the independent variables were generated to visually assess the linearity of the relationship between each of the independent variables and the dependent variable. The scatterplots for each relationship between the independent and dependent variables are illustrated in Figures 1 through Figure 6 found in Appendix D. Linear relationships were observed to exist between all independent variables and the dependent variable when assessed visually using scatterplots.

Normality test results are presented in Table 40. The Shapiro-Wilk's Test has been relied upon to test the hypothesis that the distribution is normal or that there is an absence of normality in all variable distributions. The null hypothesis associated with the test assumes that normality of the sample tested. If the assumption of normality has been violated, the "Sig" value  $p < .05$  level, and if it is not violated if  $p > .05$ . Rejecting the null hypothesis means that your data's distribution is not equal to a normal distribution (Laerd Statistics, 2015f).

	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Behavioural Intention	.316	112	.000	.735	112	.000
Perceived Ease Of Use	.352	112	.000	.749	112	.000
Compatibility	.126	112	.000	.905	112	.000
Perceived Usefulness	.254	112	.000	.722	112	.000
Perceived Risk	.212	112	.000	.897	112	.000
Perceived Trust	.414	112	.000	.681	112	.000
Self-efficacy	.358	112	.000	.739	112	.000

a. Lilliefors Significance Correction

**Table 37: Model Variables Normality Results**

None of the variables were normally distributed, as assessed by Shapiro-Wilk's test ( $p < .05$ ). The existence of significant deviations from normality indicates that a non-parametric Spearman rank-order

test is the correct test to measure the direction and strength of the relationships between independent variables and the dependent variables.

The Spearman's rank-order correlation calculates a coefficient,  $r_s$  or  $\rho$ , which measures both the strength and direction of the relationship between two variables (Laerd Statistics, 2015g).

Spearman's rank-order correlation coefficient is denoted by  $r_s$  and its value ranges from -1 (perfect negative linear relationship) to +1 (perfect positive relationship), 0 (zero) indicates no relationship between two variables (Laerd Statistics, 2015g).

Cohen (1988) argues that the correlation coefficient value displays the following properties, the closer to zero the weaker the correlation, correlation coefficient  $r_s$  range from 0.10 to 0.29 it can be considered weak; when  $r_s$  ranges from 0.3 to 0.49 it can be considered medium; when  $r$  ranges from 0.5 to 1 it can be considered strong.

Results of the Spearman rank-order correlation test are presented in Table 41.

Correlations <sup>b</sup>			Behavioural Intention
Spearman's rho	Perceived Ease Of Use	Correlation Coefficient	.508**
		Sig. (2-tailed)	0.000
	Compatibility	Correlation Coefficient	.586**
		Sig. (2-tailed)	0.000
	Perceived Usefulness	Correlation Coefficient	.661**
		Sig. (2-tailed)	0.000
	Perceived Risk	Correlation Coefficient	.426**
		Sig. (2-tailed)	0.000
	Perceived Trust	Correlation Coefficient	.504**
		Sig. (2-tailed)	0.000
	Self-efficacy	Correlation Coefficient	.549**
		Sig. (2-tailed)	0.000
	Behavioural Intention	Correlation Coefficient	1.000
		Sig. (2-tailed)	

\*\* . Correlation is significant at the 0.01 level (2-tailed).

b. Listwise N = 112

**Table 38: Correlation Matrix Random Sample 1**

The Spearman's rank-order correlation test of correlation was run to determine the relationship between the independent variables (Perceived Ease of Use, Compatibility, Perceived Usefulness, Perceived Risk, Perceived Trust, and Self-efficacy) and the dependent variable (Behavioural Intention).

Preliminary analysis showed the relationships to be linear, as assessed by visual inspection of a scatterplot. None of the variables were normally distributed, as assessed by Shapiro-Wilk's test ( $p < .05$ ). Results indicate that there exists a statistically significant strong positive correlation between Perceived ease of use ( $r_s = .508$ ,  $n = 112$ ,  $p < .001$ ), Compatibility ( $r_s = .586$ ,  $n = 112$ ,  $p < .001$ ), Perceived Usefulness ( $r_s = .661$ ,  $n = 112$ ,  $p < .001$ ), Perceived Trust ( $r_s = .504$ ,  $n = 112$ ,  $p < .001$ ), and Self-efficacy ( $r_s = .549$ ,  $n = 112$ ,  $p < .001$ ) while Perceived risk ( $r_s = .426$ ,  $n = 112$ ,  $p < .001$ ) can be considered as displaying statistically significant but moderately positive correlation with Behavioural Intention towards mobile banking.

The next section undertakes multiple regression analysis to analyse the relationship between the dependent variable and independent variables.

#### 5.3.3.2 Multiple Regression Model Testing Analysis

Multiple regression testing was performed to investigate the relationship between the single dependent variable and the independent variables. Multiple regression enables the researcher to establish the overall fit of the model and the relative contribution of each of the predictors to the total variance explained in the model (Laerd Statistics, 2015d). This regression analysis was then used to test the hypotheses postulated in this research.

A Durbin-Watson test was run to test for independence of observations statistically. The Durbin-Watson statistic can range from 0 to 4, a value of approximately 2 indicates no correlation between residuals (Laerd Statistics, 2015d).

Table 42 indicates that the Durbin-Watson statistic for the model is 2.025 indicating there was independence of residuals.

R square is known as the coefficient of determination and is a measure of the proportion of variance in the dependent variable that is explained by the independent variables in the model (Laerd Statistics, 2015d).

Table 42 presents the R square result and indicates that the model can explain 63.8% of the variance in behavioural intention towards mobile banking in Ireland.  $R^2$  for the overall model was 63.8% with an adjusted  $R^2$  of 61.8%, a large size effect according to Cohen (1988).

**Model Summary<sup>b</sup>**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.799 <sup>a</sup>	.638	.618	2.548	2.025

a. Predictors: (Constant), Self-efficacy, Perceived Risk, Compatibility, Perceived Ease Of Use, Perceived Usefulness, Perceived Trust

b. Dependent Variable: Behavioural Intention

**Table 39: R squared model summary**

Table 43 presents the results an Anova test where  $F(6,105) = 30.906$ ,  $p < .001$  indicates the statistical significance of the model. Therefore Perceived Ease of Use, Compatibility, Perceived Usefulness, Perceived Risk, Perceived Trust, and Self-efficacy are observed as statistically significant predictors of Behavioural Intention,  $F(6,105) = 30.906$ ,  $p < .001$ .

**ANOVA<sup>a</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1204.136	6	200.689	30.906	.000 <sup>b</sup>
	Residual	681.828	105	6.494		
	Total	1885.964	111			

a. Dependent Variable: Behavioural Intention

b. Predictors: (Constant), Self-efficacy, Perceived Risk, Compatibility, Perceived Ease Of Use, Perceived Usefulness, Perceived Trust

**Table 40: Model Significance**

Table 44 depicts the results of the multiple regression analysis. Perceived usefulness ( $p < .001$ ), Perceived trust ( $p < .001$ ) and Compatibility ( $p=.001$ ) have a significant effect on behavioural intention towards mobile banking. The factors that contribute most to respondent's intentions towards mobile banking are indicated by B in column 1 of Table 44, Perceived trust coefficient is .376, and perceived usefulness coefficient is .358, Compatibility has a coefficient of .248, Perceived usefulness has a coefficient of .162 while Self-efficacy has a negative coefficient of -.165 and Perceived risk also has a negative coefficient of -.010.

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
		1	(Constant)	.027			1.979		.014	.989
	Perceived Ease Of Use	.162	.099	.132	1.643	.103	-.034	.358	.530	1.886
	Compatibility	.248	.070	.281	3.547	.001	.109	.387	.548	1.824
	Perceived Usefulness	.358	.097	.324	3.692	.000	.166	.550	.448	2.231
	Perceived Risk	-.010	.057	-.014	-.171	.865	-.124	.104	.506	1.975
	Perceived Trust	.376	.098	.376	3.837	.000	.182	.570	.359	2.789
	Self-efficacy	-.165	.085	-.167	-1.938	.055	-.333	.004	.464	2.157

a. Dependent Variable: Behavioural Intention

**Table 41: Multiple Regression Analysis**

The coefficients can now be substituted into the regression equation as shown below:

$$BI = 0.027 + (.162 \times PEOU) + (.248 \times COM) + (.358 \times PU) - (.010 \times PR) + (.376 \times PTRU) - (.165 \times SE)$$

A multiple regression was run to predict behavioural intention from perceived ease of use, compatibility, perceived usefulness, perceived risk, perceived trust and self-efficacy. There was linearity as assessed by partial regression plots and a plot of studentized residuals against the predicted values. There was independence of residuals, as assessed by a Durbin-Watson statistic of 2.025. There was homoscedasticity, as assessed by visual inspection of a plot of studentized residuals versus unstandardized predicted values. There was no evidence of multicollinearity, as assessed by tolerance values greater than 0.1. There were no studentized deleted residuals greater than  $\pm 3$  standard deviations, there were 2 leverage values greater than 0.2 measuring .35 and .33, however there were no values for Cook's distance above 1. The assumption of normality was met, as assessed by Q-Q Plot. The multiple regression model statistically significantly predicted Behavioural Intention,  $F(6,105) = 30.906$ ,  $p < .001$ , adj.  $R^2 = .618$ . Perceived usefulness ( $p < .001$ ), perceived trust ( $p < .001$ ) and compatibility ( $p = .001$ ) added statistically significantly to the prediction,  $p < .05$ . Regression coefficients and standard errors can be found in Table 45.

Variable	B	SE <sub>B</sub>	$\beta$
Intercept	0.027	1.979	
Perceived Ease of Use	0.162	0.099	0.132
Compatibility	0.248	0.070	0.281*
Perceived Usefulness	0.358	0.097	0.324*
Perceived Risk	-0.010	0.057	-0.014
Perceived Trust	0.376	0.098	0.376*
Self-efficacy	-0.165	0.085	-0.167

Note. \*  $p < .05$ ; B = Unstandardised regression Coefficient;  
SEB = Standard error of the coefficient;  $\beta$  = standardised coefficient

**Table 42: Summary of Regression Analysis**

All other scatterplots, histograms and Q-Q plots used in the assumption testing can be found in Appendix D.

### **5.3.4 Model Predictive Testing**

The one-sample t-test is used to determine whether a sample comes from a population with a specific mean. A population mean is sometimes hypothesised (Laerd Statistics, 2015h). This proposed test expects an average difference of zero between the observed and predicted behavioural intention scores. The null hypothesis for the test is that there is no statistically significant difference between observed and predicted scores.

The random sample test results were examined for significant outliers. Significant outliers were identified when assessed by inspection of a boxplot. Due to the existence of significant outliers a nonparametric Wilcoxon signed-rank test was deemed the appropriate test to perform. The Wilcoxon signed-rank test is utilised to investigate whether there is a median difference between paired observations (Laerd Statistics, 2015i).

Table 46 illustrates the results of the Wilcoxon signed-rank test. Figure 22 depicts the related samples observed and predicted differences.

**Hypothesis Test Summary**

	<b>Null Hypothesis</b>	<b>Test</b>	<b>Sig.</b>	<b>Decision</b>
<b>1</b>	The median of differences between Predicted and Observed equals 0.	Related-Samples Wilcoxon Signed Rank Test	.075	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

**Table 43: Wilcoxon Signed-Rank Test Hypothesis Summary**

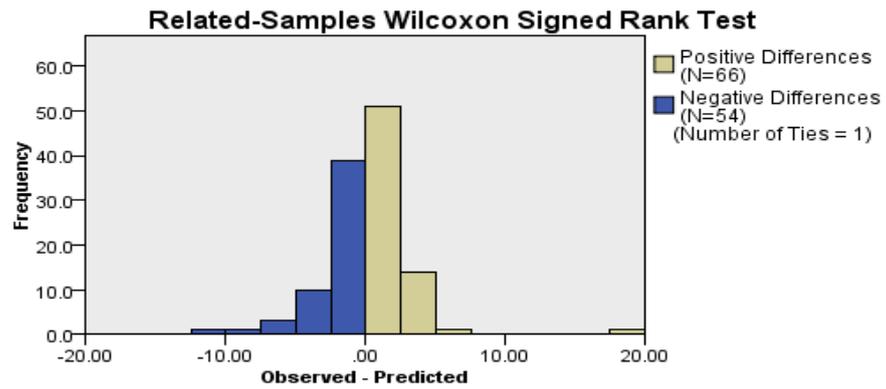
**Report**

Median

Observed	Predicted
26.0000	25.7660

**Table 44: Observed and Predicted Medians**

The second random sample of contained 121 predicted behavioural intention scores. When examined 65 had positive differences while 54 had negative differences when compared to the observed behavioural intention scores. The difference scores were symmetrically distributed, as assessed by a histogram. A Wilcoxon signed-rank test determined that there was not a statistically significant difference (Mdn = .234) between predicted behavioural intention scores (Mdn = 25.766) when compared with observed behavioural intention scores (Mdn = 26.00),  $z = 1.783$ ,  $p < .075$ . The null hypothesis is retained. The result indicates that there is not a statistically significant difference in the median of differences between predicted and observed behavioural intention scores in the sample tested.



<b>Total N</b>	121
<b>Test Statistic</b>	4,311.000
<b>Standard Error</b>	381.843
<b>Standardized Test Statistic</b>	1.783
<b>Asymptotic Sig. (2-sided test)</b>	.075

**Figure 22: Observed and Predicted Differences Distribution**

The next section will analyse the hypotheses and test results using the multiple regression results.

### 5.3.5 Hypothesis Test Results

The proposed hypotheses in the model (perceived usefulness, perceived ease of use, perceived risk, compatibility, perceived trust, self-efficacy and behavioural intention) were tested by applying the results from the multiple regression analysis. Results suggest that perceived trust as the highest contributing variable in the model ( $B = .376$ ). Hypotheses test results are presented in Table 48. Applying the results of the multiple regression analysis from Table 44 to test the hypothesis suggests the following:

Multiple regression results reported in Table 44 can be used to test if perceived usefulness effects consumers behavioural intention to use mobile banking,  $B = .358$ ,  $p < .001$ . Thus, H1 (Perceived usefulness will have a positive impact on behavioural intention to use mobile banking mobile banking) is supported.

When multiple regression results in Table 44 are used to test if there is a positive relationship between perceived ease of use and consumer behavioural intention to use mobile banking,  $B = .162$ ,  $p = .103$ . Thus H2 (Perceived ease of use increases the behavioural intention of individuals to adopt mobile banking) not supported.

Using the multiple regression results in Table 44 to test the association between perceived risk and the behavioural intention of consumers' to adopt mobile banking,  $B = -.010$ ,  $p = .865$ . Thus, H3 (Perceived risk will have a negative effect on behavioural intention to adopt mobile banking) not supported.

Utilising the multiple regression results in Table 44 to examine the association between compatibility and consumer behavioural intention to use mobile banking,  $B = .248$ ,  $p = .001$ . Thus, H4 (Compatibility will have a positive effect on behavioural intention on to adopt mobile banking) is supported.

Using the multiple regression results in Table 44 the relationship between perceived trust and consumer behavioural intention to use mobile banking,  $B = .376$ ,  $p < .001$ . Thus, H5 (Perceived trust will have a positive effect on behavioural intention to adopt mobile banking) is supported.

Applying the multiple regression results from Table 44 to test the association between self-efficacy and consumer behavioural intention to use mobile banking,  $B = -.165$ ,  $p = .055$ . Thus, H6 (Self-efficacy will have a positive effect on behavioural intention to adopt mobile banking) not supported.

Hypotheses	B	p	Result
H1: PU → BI	..358	< .001	Supported
H2: PEOU → BI	.162	.103	Not supported
H3: PR → BI	-.010	.865	Not supported
H4: COM → BI	.248	.001	Supported
H5: PTRU → BI	.376	< .001	Supported
H6: SE → BI	-.165	.055	Not supported

**Table 45: Hypotheses Test Results**

# Chapter Six: Findings and Discussions

## 6.0 Introduction

In the previous chapter the data was tested, analysed and the results of these tests presented. This chapter will discuss the possible justifications for the identified significant or insignificant relationships between the independent variables and the dependent variables. It will also provide an overview of the research and its context. The research questions are discussed in relation to the literature review and research findings.

## 6.1 Research overview and context

The aim of this research study was to explore and propose a conceptual model that explained consumers' behavioural intention to adopt of mobile banking in Ireland. By identifying the important factors contained in TAM and IDT through a literature review, the researcher was able develop a conceptual model that extended TAM and IDT to include perceived risk, perceived trust and self-efficacy. This extended model developed in this research study enabled one to explain 63.8% of the variance in consumer behavioural intention to adopt of mobile banking in Ireland. This compares favourably with the explanatory power of TAM which is  $R = 35-40\%$  as found by Venkatesh and Davis (2000).

The results of the data analysis in this research study confirm support for the hypotheses that perceived usefulness ( $B = .358, p < .001$ ), perceived trust ( $B = .376, p < .001$ ) and compatibility ( $B = .248, p = .001$ ) will have a significant positive influence on consumers behavioural intention to adopt mobile banking in Ireland. The proposed model suggests these constructs can be considered the main predictor's of behavioural intention to adopt mobile banking in Ireland.

Perceived usefulness, compatibility and perceived trust have featured in previous research into technology acceptance (Laukkanen, 2007; Kim et al., 2009; Lin, 2011; Ha et al. 2012; Al-Jabri & Sohil, 2012; ; Lee et al., 2013; Dash & Bhusan, 2014; Nel & Boshoff, 2014; Talukder et al. 2014; Ramlugun & Issuree, 2014; Shaikh & Karjaluo, 2014; Yu et al. 2015; Koksai, 2016; Alalwan et al., 2016) and the findings here are consistent with the findings of those research studies. This research study identifies perceived trust as having the most positive effect on the consumers' behavioural intention to adopt mobile banking followed by perceived usefulness and compatibility.

This research study also posited that perceived ease of use and self-efficacy would also have a significant positive effect on behavioural intention to adopt mobile banking in Ireland. However these hypotheses were not supported in the results, any effect they had was only indirect.

Additionally this research study argued that perceived risk was expected to have a significant negative effect on behavioural intention of consumers' to adopt mobile banking, this also was not supported by the results and any effect was an indirect effect also.

This research study found perceived trust ( $B = .376, p < .001$ ) to have a significant positive effect on behavioural intention towards mobile banking adoption in Ireland which is consistent with findings in previous studies by Kim et al., 2009; Nel & Boshoff, 2014; Koksai, 2016.

Therefore the researcher argues that if mobile banking is perceived as trustworthy it is more likely to be adopted. Results obtained in this research study reinforced previous findings in the area and indicated a significant relationship between perceived trust and intention to adopt mobile banking as found by Talukder et al. 2014; Koksai, 2016. Privacy and security are seen as important dimensions in banking services and mobile banking is expected to deliver these.

In this research perceived usefulness ( $B = .358, p < .001$ ) is shown to have a significant positive relationship with behavioural intention to adopt mobile banking. This finding is consistent with previous research carried out by Laukkanen, 2007; Lee et al., 2013; Ha et al., 2012; Talukder et al. 2014; ; Ramlugun & Issuree, 2014; Shaikh & Karjaluoto, 2014; Yu et al. 2015; Koksai, 2016; Alalwan et al., 2016. Mobile banking is perceived to be useful by consumers in this research study, in the survey 96.67% of respondents agreeing to some degree with the statement that "Mobile banking is useful". Results indicate that mobile banking characteristics such as ubiquity, immediacy and ability to conduct transactions or access information anytime, anywhere strengthen this perception. This leads to consumers developing a positive behavioural intention to its adoption and continued use as found by Laukkanen, 2007; Lee et al., 2013; Ha et al., 2012; Shaikh & Karjaluoto, 2014; Talukder et al. 2014; Yu et al. 2015; Koksai, 2016; Alalwan et al., 2016; Ramlugun & Issuree, 2014.

Results of the research study suggest that compatibility ( $B = .248, p = .001$ ) has a significant positive effect on behavioural intention to adopt mobile banking in Ireland. These findings concur with other research studies by Kim et al., 2009; Lin, 2011; Ha et al. 2012; Al-Jabri & Sohail, 2012; Dash & Bhusan, 2014; that found compatibility to have a significant impact as a determinant for prediction of mobile banking adoption. These findings point to the importance of the respondent's assessment of the extent to which mobile banking is compatible with their lifestyle and their familiarity with the technologies that enable it. These results indicate that if mobile banking is perceived to be consistent with the lifestyles, experience and values of individuals there is a higher probability of their adoption of mobile banking.

Perceived ease of use which Davis (1989) TAM asserts to be one of the two, (perceived usefulness and perceived ease of use), most significant factors in technology acceptance behaviour and the best predictors of future use. This research study found perceived ease of use ( $B = .162,$

$p = .103$ ) not to be a significant factor determining behavioural intention to adopt mobile banking in Ireland. This result contradicts previous findings of studies into mobile banking acceptance by Talukder et al. 2014; Shaikh & Karjaluoto, 2014; Ramlugun & Issuree, 2014; Yu et al. 2015; Koksai, 2016; Alalwan et al., 2016. This result might be explained from the fact 92.9% of respondents in this research study agreed to some degree with the statement that “Mobile banking is easy to use” in the survey instrument. Again this may be a reflection that respondents are well informed and familiar in the use of mobile technology applications and electronic banking services.

Self-efficacy which relates to the concept that when a consumer has the ability to perform a task (skills required to use an innovation) there is a higher probability that they will accept and use it as found by Ramlugun & Issuree, 2014; Koksai, 2016; Alalwan et al., 2016 This research study found self-efficacy ( $B = -.165$ ,  $p = .055$ ) not to have a statistically significant influence the behavioural intention to adopt mobile banking in Ireland. This finding is contrary to previous findings by Ramlugun & Issuree, 2014; Koksai, 2016; Alalwan et al., 2016, which found that there was a positive relationship between perceived self-efficacy and intention to adopt mobile banking. Potential reasons of explanation in the research results can be found in the high proportion of respondents that perceived mobile banking as easy to use and therefore perceive themselves as having the ability to perform mobile banking successfully. This research result may indicate higher levels of experience with mobile applications or comfort with the use of mobile banking by respondents.

Perceived risk ( $B = -.010$ ,  $p=.865$ ) in this research study, which Ram and Seth (1989) argue can cause potential adopters of new innovations to be wary and refers to the degree of risk in using innovations, is found not to statistically significant relationship to behavioural intention to adopt mobile banking in Ireland. These findings contradict previous findings in the research into mobile banking adoption by Luarn & Lin,

2005; Al-Jabri & Sohil, 2012; Ha et al. 2012 which found perceived risk to be a significant factor influencing behavioural intention to adopt mobile banking. Possible explanations for this divergence can be found in the research study. Only 14.6% of respondents either disagreed with or were undecided about the statement “Overall, I trust mobile banking” from the survey instrument which indicates that perceived risk is not perceived as a barrier to adoption in an Irish context. Both the perceived risk and perceived trust constructs were also highly correlated at .696. This indicates that the vast majority of respondents in the research study maybe aware of perceived risks, understand them and that the related uncertainty they represent has been reduced for them to a level that they find acceptable. Additionally only 31.63% of respondents did not perceive mobile banking as safe to some degree. These results might be due to the sample profile which indicates the two largest age categories of respondents of the survey instrument are 30-39 age category and 40-49 age categories with 32.4% and 30.7% respectively and secondly 76.6% of respondents indicated they held a undergraduate degree or higher. This may indicate that the sample respondents are well informed and familiar with the use of mobile technology and online banking services.

A lesser aim of the study was the identification any differences in the behavioural intention to adopt mobile banking in Ireland due to demographic factors such as gender, age and education levels. Results in the research study found that male and female distribution had no significant divergence in behavioural intentions to use mobile banking this finding was consistent with those of other studies Laukkanen, 2007; Lee et al., 2009.

When examining age categories the research study suggested that no statistically significant differences exist between behavioural intention scores of the age groupings. These findings do not concur with findings of a recent study by Koksal (2016) which revealed that younger individuals are more inclined to accept mobile banking than older ones.

In relation to the age category, the age groups 20-29 years indicated the highest intention to use mobile banking followed by 40-49 years, 30-39 years, 50-59 years and 60 and older based on mean ranks. However the differences were not found to be statistically significant. An explanation of this finding might be found in the education level profile of the sample. Table 10 shows that most of respondents 41.0% hold an Undergraduate degree; 33.6% hold a Master's degree; 2.0% attained a PhD or higher, and 13.5% and 9.8% hold Higher Diploma's and Leaving Certificate's respectively. The high level of third level education, 76.6% had an undergraduate degree or better, in the sample maybe an indication that the respondents were comfortable with technology.

This research study found that there existed a statistically significant difference between Leaving Certificate education level and Undergraduate Degree level behavioural intention towards mobile banking but not between any other education level groupings. This is consisted with the findings of by Koksai (2016) however this difference may be due to the sample being skewed towards respondents with third level education or higher.

## **6.2 Summary of Findings**

The aim of this research study was to examine the attributes of mobile banking that influence the adoption of mobile banking and develop a model for the prediction Irish consumers behavioural intention to use the technology based through the extension of TAM, IDT and integration of perceived risk, perceived trust and self-efficacy. Scale reliability, correlation and multiple linear regression testing was undertaken to develop a conceptual model. This was then tested for its predictive validity and compared to actual results from the survey instrument. The proposed model was then used to test if hypotheses set forth in the research study were supported by the results.

Results of empirical testing suggests the importance of perceived trust ( $B = .376$ ) as an influencing factor on consumers behavioural intention to adopt mobile banking Ireland. Perceived usefulness ( $B = .358$ ) and compatibility ( $B = .248$ ) are also identified as significant influencing variables on consumers behavioural intention to adopt mobile banking in Ireland.

While perceived ease of use ( $B = .162$ ), an important construct in TAM, was found not to be a significant factor influencing consumers behavioural intentions to adopt mobile banking in Ireland in contrast with previous research studies. Both perceived risk ( $B = -.010$ ) and self-efficacy ( $B = -.165$ ) were also found not to be insignificant constructs influencing consumers behavioural intention to use mobile banking in Ireland.

# **Chapter Seven: Conclusions**

## **7.0 Introduction**

The purpose of this study was to explore and propose a conceptual model that explained consumers' behavioural intentions to use mobile banking in Ireland. The researcher will now provide an overview of the research context, findings and limitations from the analysis of the results.

## **7.1 Conclusions**

The aim of this research paper was to explore and propose a conceptual model that explained consumer behavioural intention to adopt of mobile banking in Ireland. The research results indicated that the conceptual model developed enabled one to explain 63.8% of the variance in consumers' behavioural intention to adopt mobile banking in Ireland. These findings in the research study have a higher than explanatory power TAM's which is  $R=35-40\%$  as found by Venkatesh and Davis (2000).

The conceptual model developed in this research study examined the relationship between perceived usefulness, perceived ease of use, compatibility, perceived risk, perceived trust, self-efficacy and consumers' behavioural intentions to adopt mobile banking. The results of this research identified that perceived trust, perceived usefulness and compatibility had as an important positive relationship with consumers' behavioural intention to use mobile banking.

The findings of this research study indicate that there is a higher probability of consumers' adopting mobile banking if it is perceived as trustworthy. By offering specific guarantees and emphasising the technological infrastructure security, privacy, confidentiality and

reputation elements of mobile banking services provided banks can increase the levels of consumers' perceived trust in mobile banking services. This is likely to lead to increased adoption and use of mobile banking services by consumers.

The research study also found the consumers are more likely to adopt mobile banking if it is a fast, efficient and easy way to undertake banking transactions. The more useful the mobile banking service offered is perceived to be, the more likely it is to be adopted. Banks need to try and illustrate how mobile banking has the potential to be useful to consumers, making their banking lives easier by removing the need to be physically present in a branch, use an ATM or have access to a desktop PC. Further banks should emphasise mobile banking's ubiquity and "anywhere anytime" availability. If banks can demonstrate mobile banking's usefulness to both existing and potential customers, adoption rates are likely to increase. Therefore banks need to identify which services the consumer perceives as useful and design mobile banking services that meet consumer needs.

The findings of this research study also indicate that mobile banking adoption rates are likely to increase if they are compatible with consumers' experiences, lifestyle, and beliefs and fulfil their expectations. This study has illustrated the importance placed on compatibility of new technologies and services by consumers. Banks must strive to develop and deliver mobile banking services that are compatible with existing technologies which consumers are familiar with. The study found that if consumers view mobile banking as compatible with their beliefs, values, lifestyle and experiences there is a higher probability that they will adopt mobile banking.

Perceived risk, perceived ease of use and self-efficacy constructs were found not to have significant relationships with consumers' behavioural intention to adopt mobile banking.

## **7.2 Limitations and Further Research**

The research findings raised a number of areas of interest which could be examined in more detail through qualitative research to gain a deeper understanding of the role of the various constructs within the model and consumers behavioural intentions. The constructs of perceived trust, perceived usefulness and compatibility were found to have a significant positive relationship with consumers' behavioural intention to use mobile banking. A deeper understanding of consumer understanding of these concepts and the strength of their influence would be beneficial. More qualitative or mixed method research studies should be undertaken to analyse consumer behavioural intention towards mobile banking.

A limitation of the research study is that it concentrated on six factors affecting behavioural intention to adopt mobile banking. The proposed model has an explanatory power of 63.8%. In doing this the research may have overlooked additional important constructs such as social influence whose inclusion may have increased the model's explanatory power. Another limitation relates to the survey and sample techniques employed in the research study. An online survey and a snowball sampling technique was employed which may have resulted in a sample that was not a true representation of the population. This limitation can be overcome by increasing the sample size and employing different survey methods and sampling techniques in future research. The most significant limitation of the research only measures behavioural intention to adopt mobile banking and not actual adoption behaviour.

### **7.3 Conclusion**

This chapter details the conclusions from the research study and their management implications. It proposes areas for future research that this study did not include, as well as the limitations of the research.

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## **Appendices**

### **Appendix A: Cover Email**

Dear Recipient,

I am currently completing a Master's in Business Administration. This survey forms part of my MBA Thesis at National College of Ireland. The questionnaire has been designed to investigate consumer's adoption of mobile banking services in Ireland.

Your participation is voluntary, if you do not wish to participate you may simply discard the survey.

The survey consists of 28 questions and will take approximately 5 minutes of your time and contribution will help make the survey a success and is greatly appreciated. The information provided will be confidential and used only for purpose of this study.

Please click the button to take the survey.

Yours Sincerely

Michael Verrecchia  
National College of Ireland  
School of Business  
Michael.Verrecchia@student.ncirl.ie

## Appendix B: Survey Questions

### Mobile Banking Adoption

#### Demographic information

\* 1. Are you male or female?

- Male  
 Female

\* 2. What is your age?

- <20  
 21-29  
 30-39  
 40-49  
 50-59  
 60 or older

\* 3. What is the highest level of education you have completed?

- Leaving Certificate or below  
 Higher Diploma  
 Undergraduate Degree  
 Master's Degree  
 PHD or higher

## Mobile Banking Adoption

### Perceived Usefulness of Mobile Banking

The following questions used a 1 to 7 Likert scale to study respondent's behaviour in relation to conceptual framework constructs where 1 signified "strongly disagree" and 7 signified "strongly agree".

4. Using mobile banking enables me to do my banking transactions quicker

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

5. Using mobile banking enhances the efficiency of my banking activities

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
<input type="radio"/>						

6. Using mobile banking makes it easier to do my banking transactions

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

7. Mobile banking is useful

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

## Mobile Banking Adoption

### Perceived Ease of Use of Mobile Banking

8. Mobile banking is easy to use

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

9. Using Mobile Banking does not require a lot of mental effort

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

10. Learning to use mobile banking is easy

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

11. It is easy to become skilful in using mobile banking

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
<input type="radio"/>						

## Mobile Banking Adoption

### Compatibility of Mobile Banking with lifestyle

12. Mobile Banking fits well with the way I like to manage my finances

Somewhat Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

13. Using Mobile Banking fits into my working style

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
<input type="radio"/>						

14. I like to try new technology

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

15. I like to adopt new innovation

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

16. Mobile Banking is compatible with my lifestyle

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

## Mobile Banking Adoption

### Perceived Risk of Mobile Banking

The following questions used a 1 to 7 Likert scale to study respondent's behaviour in relation to conceptual framework constructs where 1 signified "Very risky" and 7 signified "Very safe".

17. Considering the possibility of monetary loss associated with Mobile Banking, how risky do you consider mobile banking to be?

Very Risky	Risky	Somewhat Risky	Undecided	Somewhat Safe	Safe	Very Safe
<input type="radio"/>						

18. Considering the possibility of harm to you resulting from the misuse of important personal and financial information due to the use of Mobile Banking, how risky do you consider mobile banking to be?

Very Risky	Risky	Somewhat Risky	Undecided	Somewhat Safe	Safe	Very Safe
<input type="radio"/>						

19. Considering the possible loss of privacy because of information collected about you as you use mobile banking, how risky do you consider mobile banking to be?

Very Risky	Risky	Somewhat Risky	Undecided	Somewhat Safe	Safe	Very Safe
<input type="radio"/>						

20. How risky do you rate Mobile Banking

Very Risky	Risky	Somewhat Risky	Undecided	Somewhat Safe	Safe	Very Safe
<input type="radio"/>						

## Mobile Banking Adoption

### Perceived Trust in Mobile Banking

21. Mobile Banking is trustworthy

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

22. Mobile Banking serves the present and future interests of users

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

23. Mobile Banking keeps its promises and commitments

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

24. Overall, I trust Mobile Banking

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
<input type="radio"/>						

## Mobile Banking Adoption

### Perceived Self-Efficacy

25. I am confident of using Mobile Banking even if there is no one around to show me how to do it

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

26. I am confident of using Mobile Banking even if I have only the online instructions for reference

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

27. I am confident of using Mobile Banking even if I have just the online "help" function for assistance

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

28. I am confident in using Mobile Banking if I have sufficient time to complete the transactions

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
<input type="radio"/>						

## Mobile Banking Adoption

### Mobile banking Continued Use Intention

29. I intend to use mobile banking regularly in the future

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

30. I will frequently use mobile banking in the future

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

31. I intend to use mobile banking more regularly in the future

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

32. I will use mobile banking for my banking needs

Strongly Disagree	Disagree	Somewhat Disagree	Undecided	Somewhat Agree	Agree	Strongly Agree
<input type="radio"/>						

## Appendix C: Descriptive Statistics Demographics

### Behavioural Intention and Gender

			Descriptives		
Gender			Statistic	Std. Error	
Behavioural Intention	Male	Mean	24.96	.354	
		95% Confidence Interval for Mean	Lower Bound	24.26	
			Upper Bound	25.66	
		5% Trimmed Mean	25.51		
		Median	26.00		
		Variance	16.131		
		Std. Deviation	4.016		
		Minimum	4		
		Maximum	28		
		Range	24		
		Interquartile Range	4		
		Skewness	-2.440	.213	
		Kurtosis	8.076	.423	
		Female	Mean	24.42	.438
	95% Confidence Interval for Mean		Lower Bound	23.55	
			Upper Bound	25.29	
	5% Trimmed Mean		25.02		
	Median		24.00		
	Variance		19.936		
	Std. Deviation		4.465		
	Minimum		8		
	Maximum		28		
	Range		20		
Interquartile Range	4				
Skewness	-1.985	.237			
Kurtosis	4.089	.469			

**Table 46: Behavioural Intention and Gender Descriptive Statistics**

## Behavioural Intention and Age

### Descriptives

Age		Statistic	Std. Error		
Behavioural Intention	20-29	Mean	25.49	.653	
		95% Confidence Interval for Mean	Lower Bound	24.16	
			Upper Bound	26.81	
		5% Trimmed Mean	26.06		
		Median	28.00		
		Variance	14.904		
		Std. Deviation	3.861		
		Minimum	10		
		Maximum	28		
		Range	18		
		Interquartile Range	4		
		Skewness	-2.423	.398	
		Kurtosis	7.352	.778	
		30-39	30-39	Mean	24.68
95% Confidence Interval for Mean	Lower Bound			23.64	
	Upper Bound			25.73	
5% Trimmed Mean	25.28				
Median	24.00				
Variance	20.135				
Std. Deviation	4.487				
Minimum	4				
Maximum	28				
Range	24				
Interquartile Range	4				
Skewness	-2.226			.281	
Kurtosis	6.318			.555	
40-49	40-49			Mean	25.15
		95% Confidence Interval for Mean	Lower Bound	24.29	
			Upper Bound	26.02	
		5% Trimmed Mean	25.73		
		Median	26.00		
		Variance	14.807		
		Std. Deviation	3.848		
		Minimum	8		
		Maximum	28		
		Range	20		
		Interquartile Range	4		
		Skewness	-2.473	.272	
		Kurtosis	7.340	.538	
		50-59	50-59	Mean	23.67
95% Confidence Interval for Mean	Lower Bound			22.09	
	Upper Bound			25.25	
5% Trimmed Mean	24.30				
Median	24.00				
Variance	21.829				
Std. Deviation	4.672				
Minimum	8				
Maximum	28				
Range	20				
Interquartile Range	2				
Skewness	-2.279			.393	
Kurtosis	5.841			.768	
60 or older	60 or older			Mean	22.91
		95% Confidence Interval for Mean	Lower Bound	20.20	
			Upper Bound	25.62	
		5% Trimmed Mean	23.01		
		Median	24.00		
		Variance	16.291		
		Std. Deviation	4.036		
		Minimum	16		
		Maximum	28		
		Range	12		
		Interquartile Range	4		
		Skewness	-7.67	.661	
		Kurtosis	-0.35	1.279	

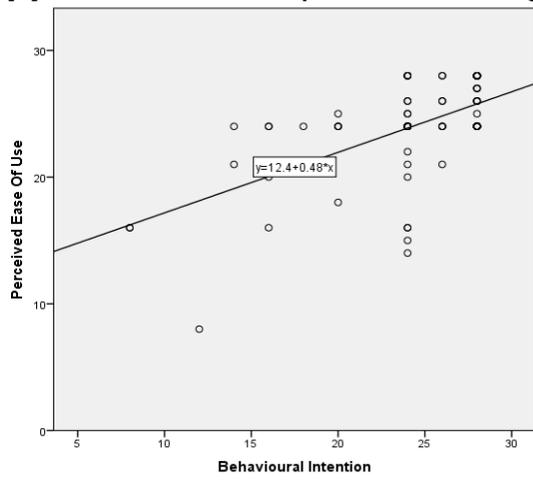
Table 47: Behavioural Intention and Age Descriptive Statistics

## Behavioural Intention and Education Level

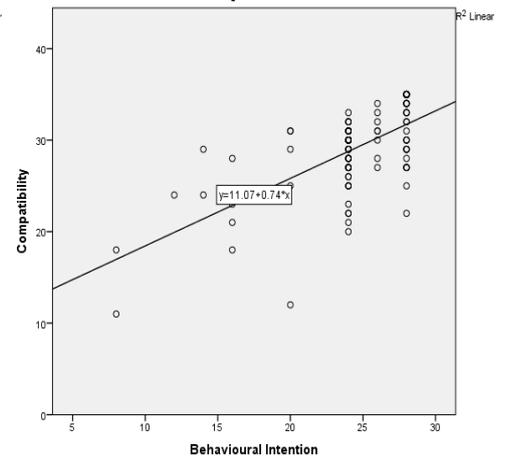
Descriptives			Statistic	Std. Error	
Education Level					
Behavioural Intention	Leaving Certificate	Mean	21.90	1.283	
		95% Confidence Interval for Mean	19.23		
			Lower Bound	24.58	
			Upper Bound		
		5% Trimmed Mean	22.33		
		Median	24.00		
		Variance	34.590		
		Std. Deviation	5.881		
		Minimum	8		
		Maximum	28		
	Range	20			
	Interquartile Range	12			
	Skewness	-.835	.501		
	Kurtosis	-.104	.972		
	Higher Diploma	Mean	24.39	.733	
		95% Confidence Interval for Mean	22.89		
			Lower Bound	25.88	
			Upper Bound		
		5% Trimmed Mean	24.84		
		Median	24.00		
Variance		16.645			
Std. Deviation		4.080			
Minimum		12			
Maximum		28			
Range	16				
Interquartile Range	4				
Skewness	-1.665	.421			
Kurtosis	2.905	.821			
Undergraduate Degree	Mean	25.50	.385		
	95% Confidence Interval for Mean	24.74			
		Lower Bound	26.26		
		Upper Bound			
	5% Trimmed Mean	26.08			
	Median	26.00			
	Variance	14.232			
	Std. Deviation	3.772			
	Minimum	4			
	Maximum	28			
Range	24				
Interquartile Range	4				
Skewness	-2.984	.246			
Kurtosis	12.377	.488			
Masters Degree	Mean	24.65	.462		
	95% Confidence Interval for Mean	23.73			
		Lower Bound	25.57		
		Upper Bound			
	5% Trimmed Mean	25.25			
	Median	24.00			
	Variance	17.091			
	Std. Deviation	4.134			
	Minimum	8			
	Maximum	28			
Range	20				
Interquartile Range	4				
Skewness	-2.408	.269			
Kurtosis	7.048	.532			
PHD or higher	Mean	24.80	.800		
	95% Confidence Interval for Mean	22.58			
		Lower Bound	27.02		
		Upper Bound			
	5% Trimmed Mean	24.67			
	Median	24.00			
	Variance	3.200			
	Std. Deviation	1.789			
	Minimum	24			
	Maximum	28			
Range	4				
Interquartile Range	2				
Skewness	2.236	.913			
Kurtosis	5.000	2.000			

**Table 48: Behavioural Intention and Education Level Descriptive Statistics**

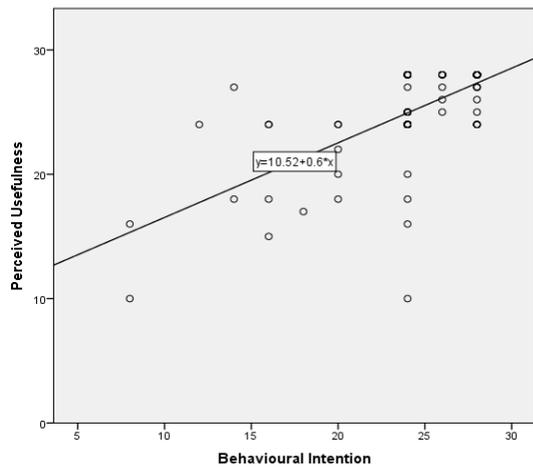
## Appendix D: Multiple Linear Regression Assumption Tests



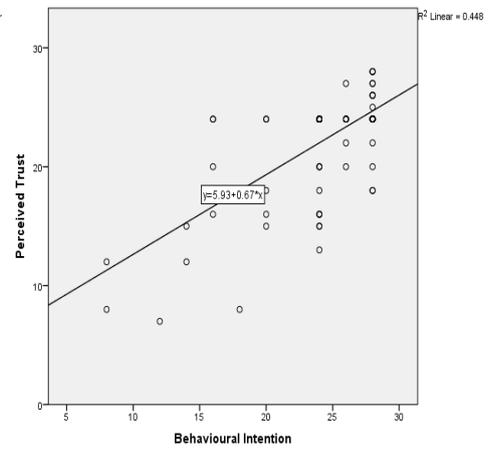
**Figure 23: Perceived ease of use and Behavioural Intention**



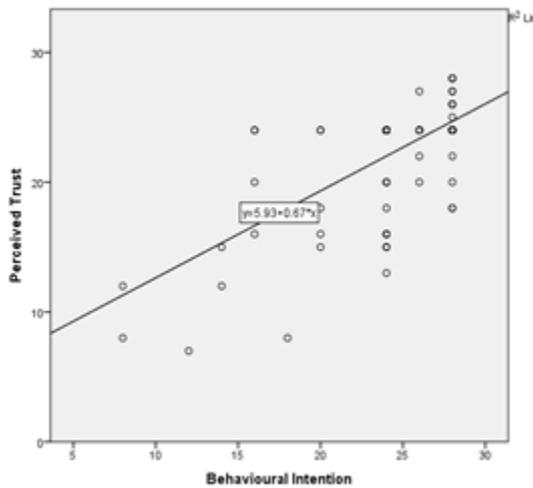
**Figure 24: Compatibility and Behavioural Intention**



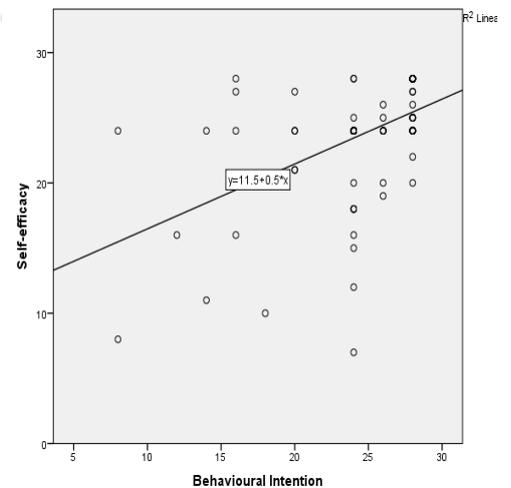
**Figure 25: Perceived Usefulness and Behavioural Intention**



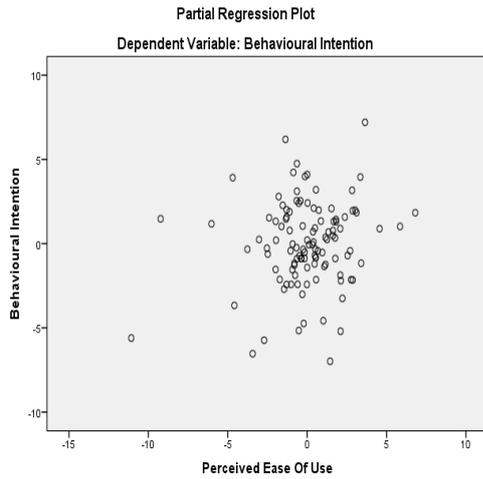
**Figure 26: Perceived Risk and Behavioural Intention**



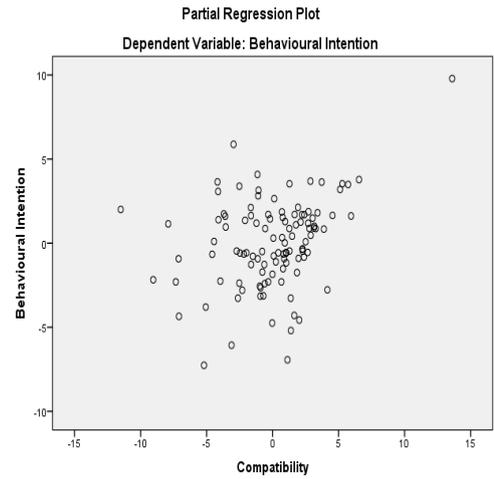
**Figure 27: Perceived Trust and Behavioural Intention**



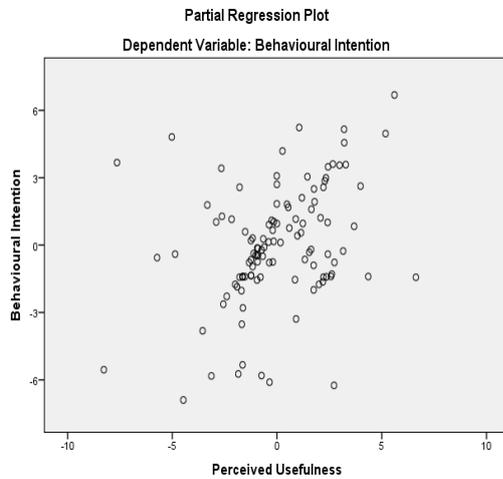
**Figure 28: Self-Efficacy and Behavioural Intention**



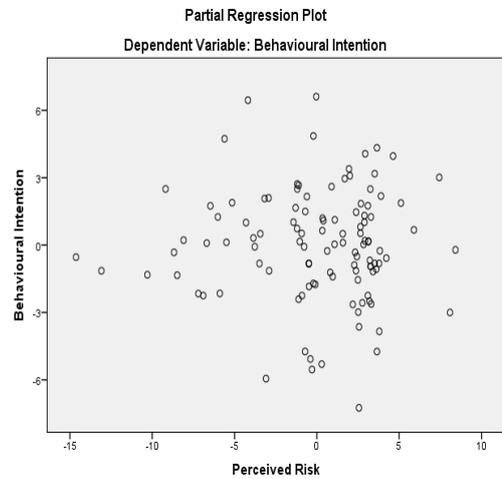
**Figure 29: Behavioural Intention and Perceived Ease of Use**



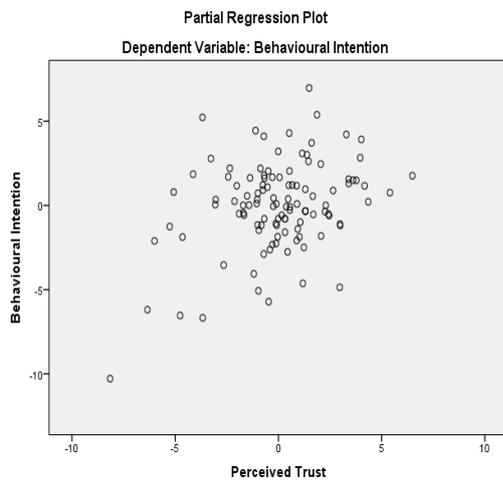
**Figure 30: Behavioural Intention and Compatibility**



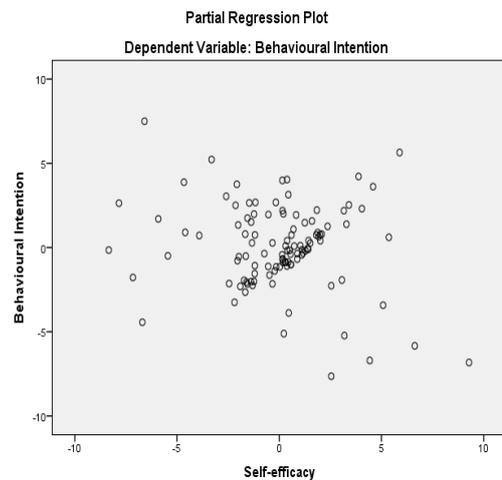
**Figure 31: Behavioural Intention and Perceived Usefulness**



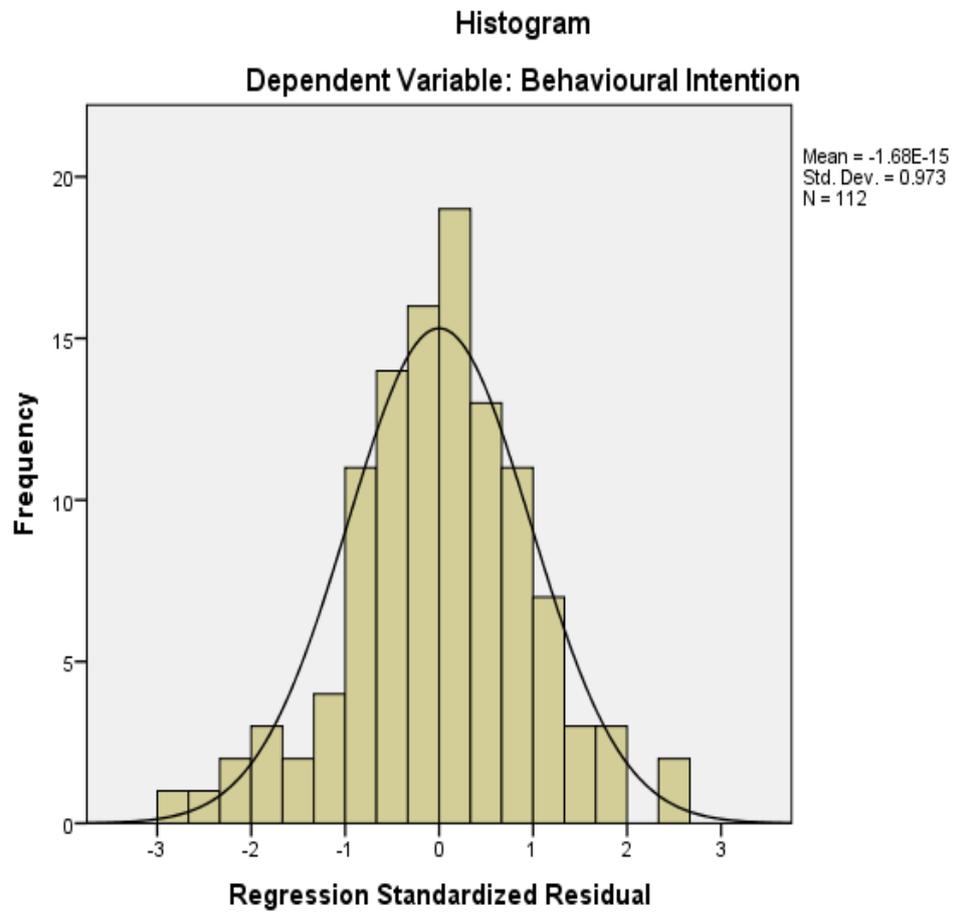
**Figure 32: Behavioural Intention and Perceived Risk**



**Figure 33: Behavioural Intention and Perceived Trust**



**Figure 34: Behavioural Intention and Self-efficacy**



**Figure 35: Distribution of Standardized Residuals**

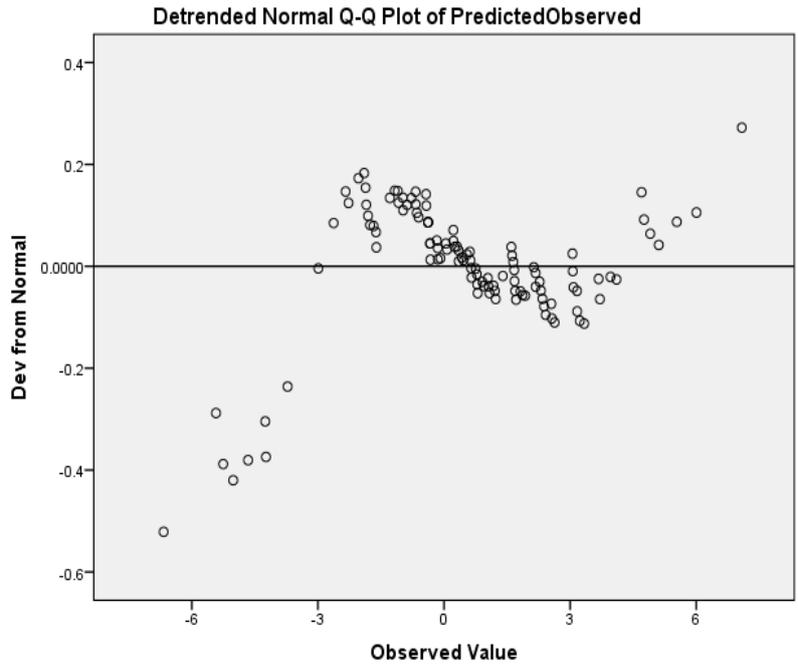


Figure 36: Normal Q-Q Plot Predicted and Observed

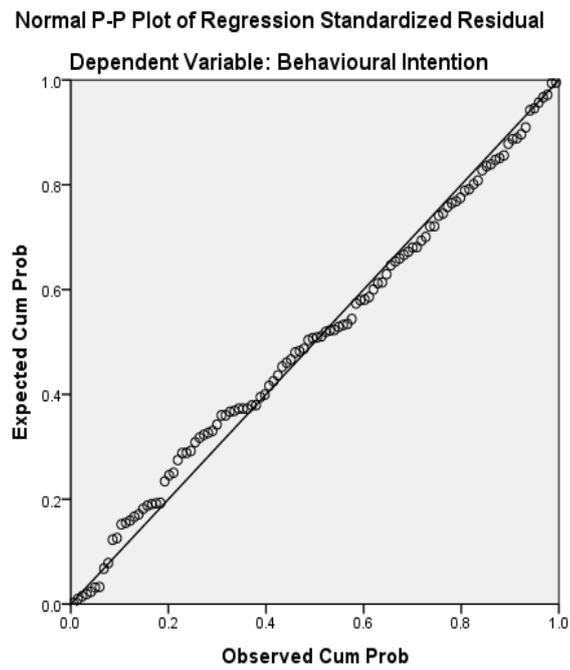


Figure 37: Normal P-Plot Standardised Residuals

**Descriptives**

			Statistic	Std. Error
Behavioural Intention	Mean		24.52	.389
	95% Confidence Interval for Mean	Lower Bound	23.75	
		Upper Bound	25.29	
	5% Trimmed Mean		25.04	
	Median		24.00	
	Variance		16.991	
	Std. Deviation		4.122	
	Minimum		8	
	Maximum		28	
	Range		20	
	Interquartile Range		4	
	Skewness		-1.933	.228
	Kurtosis		4.458	.453
	Perceived Ease Of Use	Mean		24.12
95% Confidence Interval for Mean		Lower Bound	23.49	
		Upper Bound	24.75	
5% Trimmed Mean			24.46	
Median			24.00	
Variance			11.293	
Std. Deviation			3.360	
Minimum			8	
Maximum			28	
Range			20	
Interquartile Range			2	
Skewness			-1.876	.228
Kurtosis			5.410	.453
Compatibility		Mean		29.15
	95% Confidence Interval for Mean	Lower Bound	28.28	
		Upper Bound	30.03	
	5% Trimmed Mean		29.54	
	Median		30.00	
	Variance		21.788	
	Std. Deviation		4.668	
	Minimum		11	
	Maximum		35	
	Range		24	
	Interquartile Range		5	
	Skewness		-1.250	.228
	Kurtosis		2.520	.453
	Perceived Usefulness	Mean		25.24
95% Confidence Interval for Mean		Lower Bound	24.54	
		Upper Bound	25.94	
5% Trimmed Mean			25.72	
Median			27.00	
Variance			13.896	
Std. Deviation			3.728	
Minimum			10	
Maximum			28	
Range			18	
Interquartile Range			4	
Skewness			-1.964	.228
Kurtosis			4.492	.453
Perceived Risk		Mean		19.18
	95% Confidence Interval for Mean	Lower Bound	18.07	
		Upper Bound	20.29	
	5% Trimmed Mean		19.43	
	Median		20.00	
	Variance		34.959	
	Std. Deviation		5.913	
	Minimum		4	
	Maximum		28	
	Range		24	
	Interquartile Range		10	
	Skewness		-.681	.228
	Kurtosis		-.585	.453
	Perceived Trust	Mean		22.36
95% Confidence Interval for Mean		Lower Bound	21.58	
		Upper Bound	23.13	
5% Trimmed Mean			22.77	
Median			24.00	
Variance			17.006	
Std. Deviation			4.124	
Minimum			7	
Maximum			28	
Range			21	
Interquartile Range			0	
Skewness			-1.901	.228
Kurtosis			3.439	.453
Self-efficacy		Mean		23.71
	95% Confidence Interval for Mean	Lower Bound	22.92	
		Upper Bound	24.49	
	5% Trimmed Mean		24.22	
	Median		24.00	
	Variance		17.471	
	Std. Deviation		4.180	
	Minimum		7	
	Maximum		28	
	Range		21	
	Interquartile Range		2	
	Skewness		-1.966	.228
	Kurtosis		4.640	.453

**Table 49: Independent Variable Distributions**